

**Lucent Technologies**  
Bell Labs Innovations



**DEFINITY®**  
**Enterprise Communications Server**  
**Release 5**  
**System Monitoring and Reporting**

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- Answered by the called station
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- Routed to a recorded announcement that can be administered by the CPE user

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- Electromagnetic Compatibility (89/336/EEC)
- Low Voltage (73/23/EEC)
- Telecommunications Terminal Equipment (TTE) i-CTR3 BRI and i-CTR4 PRI

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### Acknowledgment

This document was prepared by Product Documentation Development, Lucent Technologies, Denver, CO.

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## **About This Document**

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This document provides a comprehensive description of the performance reports that are available with the DEFINITY Enterprise Communications Server (ECS).

This document covers information related to DEFINITY ECS Release 5, and includes all incremental releases up to and including Release 5.4. For details about changes for Release 5.4, refer to *DEFINITY Enterprise Communications Server Release 5.4.0, Change Description*.

## **Purpose of Traffic Reports**

The traffic measurements and their associated reports are designed to monitor and collect traffic data (also called usage data) for trunk groups, hunt groups, the attendant group, etc. The system accumulates and stores the traffic data. You can display (and/or print) the traffic data, as an organized report, by issuing the appropriate identifying command from the management terminal.

The system reports and the supporting information contained within this document permit you to:

- Monitor and evaluate system performance
- Monitor security violations data, which identifies illegal attempts to access the system
- Observe usage trends and recommend possible corrective actions, as needed
- Determine the source of performance degradations (for example, processor overload)

- Determine possible trunk problems (for example, blocking level too high)
- Recommend system updates and upgrades, when appropriate

## **Who Should Read This Document**

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This document is intended for:

- System Administrators
- Communications System Managers
- Technicians who resolve certain usage-related customer complaints
- Technicians who plan system expansions and upgrades
- Personnel involved in traffic engineering

### **⇒ NOTE:**

You do not need a thorough knowledge of traffic theory to use the information contained in this document. However, such knowledge is helpful if you want to perform in-depth analysis of the traffic data presented in the various reports.

## **How This Document Is Organized**

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This document consists of six chapters, an appendix, a list of abbreviations, and a glossary.

- [Chapter 1, "How to Enter Commands, and Display and Print Reports"](#) lists each traffic command, describes the different types of commands, and describes how to enter a command to display and/or print a report.
- [Chapter 2, "System Printer and Report-Scheduler"](#) describes the Report Scheduler software and how to schedule and print reports on the system printer.
- [Chapter 3, "Traffic Data Analysis"](#) provides detailed descriptions of the traffic measurement reports, excluding processor occupancy and security violations reports.
- [Chapter 4, "Processor Occupancy Reports"](#) describes the purpose of these four reports, when to use each report, and how to interpret each report's data. It also lists "Suggested Actions" that may be taken if a particular field should report data indicating an abnormal condition.
- [Chapter 5, "Security Violations Reports"](#) describes the reports that contain data on possible security violations.
- [Chapter 6, "Recent Change History Report"](#) describes the report that lists the most recent administration and maintenance changes.
- [Appendix A, "Blank Worksheets"](#).

- Attendant Group Data Worksheet — Used for historical purposes to record the Attendant Group daily measurements for the selected days.
- Routing Pattern Data Worksheet — Used for historical purposes to record the Routing Pattern daily measurements for the selected pattern number and days.
- Hunt Group Data Worksheet — Used for historical purposes to record the Hunt Group daily measurements for the selected hunt group and days.
- Trunk Group Data Worksheet — Used for historical purposes to record the Trunk Group daily measurements for the selected trunk group and days.
- Wideband Trunk Group Worksheet — Used for historical purposes to record the Wideband Trunk Group daily measurements for the selected trunk groups and days.
- Processor Occupancy Data Worksheets — Used for historical purposes to record the Processor Occupancy daily measurements for the selected days.
- General Traffic, ACD, and Callvisor. ASAI/OCM Applications — Used to calculate the BHCC for complex traffic applications.
- [Appendix B, "References"](#) provides an abbreviated listing and description of system documents. Ordering information is also included.
- [Glossary and Abbreviations](#) contains a list of abbreviations, frequently used terms and their definitions.
- [Index](#).

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## **Conventions Used in This Document**

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This manual uses the following conventions:

- Anything that you type at the command prompt appears in the following typeface:  
**change system-parameters feature**
- Information displayed on the screen is shown in the following typeface:  
login:
- Keyboard keys are shown as follows: RETURN

## **Related Resources**

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For the names and document numbers of manuals that contain additional information, see [Appendix B, "References"](#) in this book.

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# How to Enter Commands, and Display and Print Reports

# 1

---

## Commands and the Command Line Format

---

The DEFINITY Enterprise Communications Server management terminal is the primary device for issuing commands to the system. Following a successful login procedure, the screen will display the prompt:

Command :

If you know it, enter the complete command. Alternately, you may use HELP to obtain the list of permissible commands.

The command line consists of three parts. The parts are known as (1) the **ACTION** to be taken, (2) the **OBJECT** for the specified action, and (3) the **QUALIFIER** for the specified object. [Table 1-1](#) lists all of the commands that are associated with the traffic measurements.

**Table 1-1. Traffic Measurement Commands**

COMMANDS		
Action	Object	Qualifier
change	meas-selection coverage	
change	meas-selection principal	
change	meas-selection route-pattern	
change	meas-selection trunk-group	
change	meas-selection wideband-trunk-group	
change	report-scheduler	[option] = report numbers
clear	measurements ds1	CabCarSSF [options]
clear	measurements ds1-facility	CabCarSSF [options] [print or schedule]
clear	measurements occupancy	busiest - intervals
clear	measurements security-violations	
display	meas-selection coverage	[print or schedule]
display	meas-selection principal	[print or schedule]
display	meas-selection route-pattern	[print or schedule]
display	meas-selection trunk-group	[print or schedule]
display	meas-selection wideband-trunk-group	[print or schedule]
list	aca-parameters	[print or schedule] [options]
list	measurements aca	[print or schedule]
list	measurements attendant	group/positions [print or schedule]
list	measurements blockage pn	[option] [print or schedule]
list	measurements blockage sn	[option] [print or schedule]
list	measurements call-rate	[print or schedule]
list	measurements call-summary	[print or schedule]
list	measurements cbc-trunk-group	<tn>last-hour[print or schedule]
list	measurements communications-links	xx-yy[print or schedule]
list	measurements coverage-path	[options] [print or schedule]
list	measurements ds1 summary	CabCarSSF [options] [print or schedule]
list	measurements ds1 log	CabCarSSF [options] [print or schedule]
list	measurements ds1-facility summary	CabCarSSF [options] [print or schedule]
list	measurements ds1-facility log	CabCarSSF [options] [print or schedule]
list	measurements hunt-group	[option] [print or schedule]
list	measurements lar-route-pattern	<pat_no> [option] [print or schedule]
list	measurements lightly-used-trunk	[option] [print or schedule]
list	measurements load-balance incoming	[option] [print or schedule]

*Continued on next page*

**Table 1-1. Traffic Measurement Commands — Continued**

COMMANDS		
Action	Object	Qualifier
list	measurements load-balance intercom	[option] [print or schedule]
list	measurements load-balance outgoing	[option] [print or schedule]
list	measurements load-balance tandem	[option] [print or schedule]
list	measurements load-balance total	[option] [print or schedule]
list	measurements modem-pool	[option] [print or schedule]
list	measurements occupancy busiest-intervals	[print or schedule]
list	measurements occupancy last-hour	[print or schedule]
list	measurements occupancy pktint	[print or schedule]
list	measurements occupancy summary	[print or schedule]
list	measurements outage-trunk	[option] [print or schedule]
list	measurements principal	[options] [print or schedule]
list	measurements route-pattern	<pat_no> [option] [print or schedule]
list	measurements security-violations detail	[print or schedule]
list	measurements security-violations summary	[print or schedule]
list	measurements summary	[print or schedule]
list	measurements tone-receiver detail	[option] [print or schedule]
list	measurements tone-receiver summary	[option] [print or schedule]
list	measurements trunk-group hourly	<tgn> [print or schedule]
list	measurements trunk-group summary	[option] [print or schedule]
list	measurements wideband-trunk-group hourly	<tgn> [print or schedule]
list	measurements wideband-trunk-group summary	[option] [print or schedule]
list	performance attendant	[option] [print or schedule]
list	performance hunt-group	[option] [print or schedule]
list	performance summary	[option] [print or schedule]
list	performance trunk-group	[option] [print or schedule]
list	report-scheduler	[print or schedule]
monitor	security-violations	[option] [print]
monitor	system	<conn>, <scr>, <view1>, <view2>
monitor	traffic hunt-groups	<hgn> starting group number
monitor	traffic trunk-groups	<tgn> starting group number
monitor	trunk	<tgn> or <member #>
remove	report-scheduler	[option] = report numbers

## Monitor Commands

---

Use the **monitor** command to display real-time status reports. Whenever a status report is displayed on the management terminal, it is automatically updated every thirty seconds. Press CANCEL to cancel the **monitor** command.

### NOTE:

When canceling out of some monitor commands, the management terminal interface is automatically logged off. This is not administrable.

If the status report consists of more than one page, use NEXT PAGE to display any subsequent pages and PREV PAGE to display previous pages.

If you enter the **monitor** command incorrectly, or if the qualifier is not applicable or cannot be measured, a descriptive error message appears on the message line. The message line is the bottom line on the screen. Usually the error messages provide enough detail to determine the problem. However, you may press HELP when needed.

## List Commands

---

Use the **list** command to obtain historical information for a list of all (or a selected range of) attendants, trunk groups, hunt groups, etc.

## Display Commands

---

Use the **display** command to identify the parameters associated with a specific object/qualifier (for example, the parameters that are being measured)

## Change Commands

---

Use the **change** command to alter the group of parameters that are being measured

## Clear Commands

---

Use the **clear** command to remove the measurement data that was generated as the result of an alarm or a system irregularity.

## Displaying Reports

---

The commands, listed in [Table 1-1](#), and the resulting reports are described in detail in Chapters 2–6.

Each of the **monitor** and **list** commands, depicted in [Table 1-1](#), results in producing (displaying) a different report on the management terminal screen. If

the command line qualifier **print** is selected — the report is immediately printed on the slave printer that is associated with the management terminal. Whenever the command line qualifier **schedule** is initially executed, the system defaults the report for immediate printing (on the System Printer unless a day and time of day is scheduled) and generates a Job Id. The Job Id is required by the Report Scheduler feature for updating and deleting the schedule of reports. The Report Scheduler, which is described in [Chapter 2, "System Printer and Report-Scheduler"](#), is used to administer a time/day schedule for each desired report.

## Screen Format

The on screen format for reports is as shown in [Figure 1-1](#).

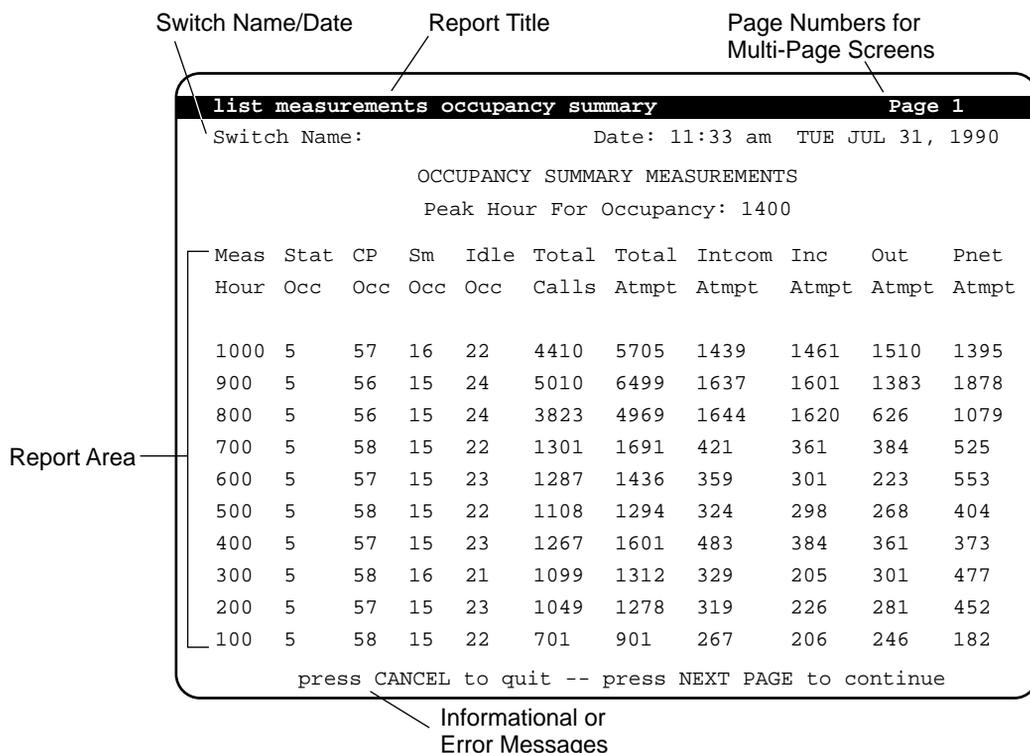
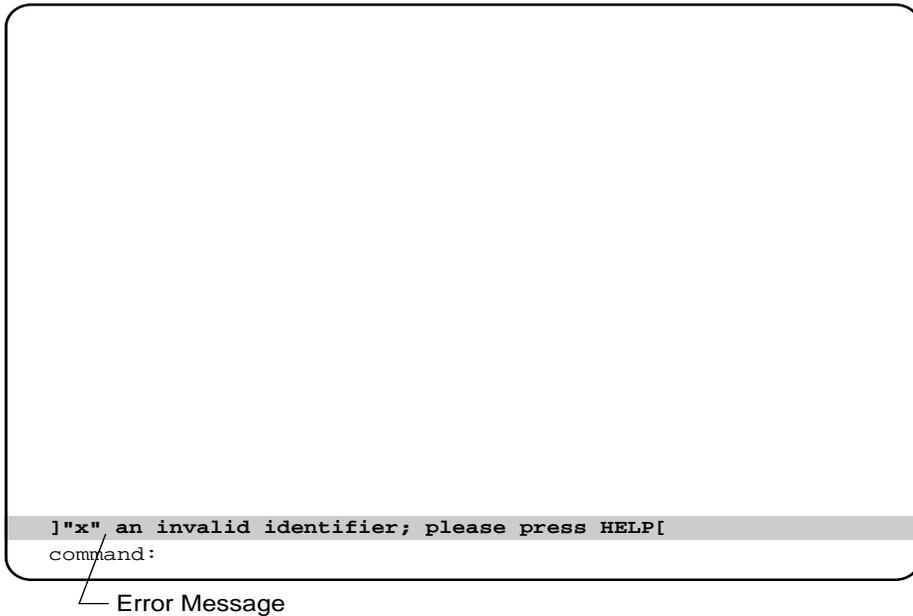


Figure 1-1. Screen Format

Error messages appear highlighted above the command line, as shown in [Figure 1-2](#).

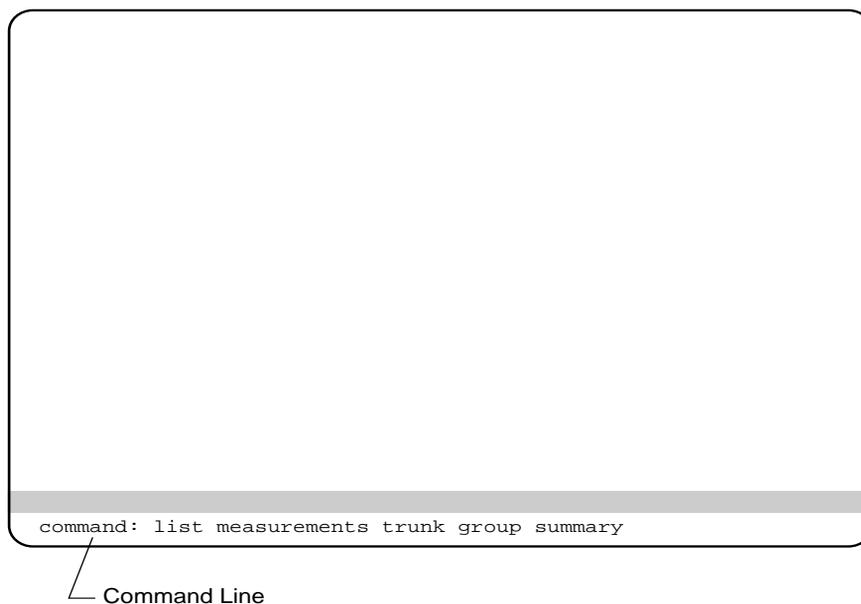


---

**Figure 1-2. Error Message**

Commands that you type appear as shown in [Figure 1-3](#).

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**Figure 1-3. Command Line**

## Command Structure

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A common command structure is shared across the Release 5vs/si and Release 5r machines. [Table 1-2](#) lists the categories of commands on the specified machines. Not listed are the *list measurements* commands. See [Table 1-1](#) for these.

**Table 1-2. Comparison of Release 5si and Release 5r Traffic-Related Commands**

Release 5si Traffic-Related Commands			Release 5r Traffic-Related Commands		
Action	Object	Qualifier	Action	Object	Qualifier
change	meas-selection	coverage	change	meas-selection	coverage
change	meas-selection	principal	change	meas-selection	principal
change	meas-selection	route-pattern	change	meas-selection	route-pattern
change	meas-selection	trunk-group	change	meas-selection	trunk-group
change	meas-selection	wideband-trunk-group	change	meas-selection	wideband-trunk-group
clear	measurements	ds1	clear	measurements	ds1
n/a			clear	measurements	ds1-facility
clear	measurements	security-violations	clear	measurements	security-violations
clear	measurements	occupancy busiest-intervals	clear	measurements	occupancy busiest-intervals
display	meas-selection	coverage	display	meas-selection	coverage
display	meas-selection	principal	display	meas-selection	principal
display	meas-selection	route-pattern	display	meas-selection	route-pattern
display	meas-selection	trunk-group	display	meas-selection	trunk-group
display	meas-selection	wideband-trunk-group	display	meas-selection	wideband-trunk-group
list	performance	attendant-group	list	performance	attendant-group
list	performance	hunt-group	list	performance	hunt-group
list	performance	trunk-group	list	performance	trunk-group
list	performance	summary	list	performance	summary
monitor	traffic	hunt-groups	monitor	traffic	hunt-groups
monitor	traffic	trunk-groups	monitor	traffic	trunk-groups
monitor	system	view1	monitor	system	view1
monitor	system	view2	monitor	system	view2

## **Release 5si and Release 5r Reports**

This book covers all the Definity Release 5si and Release 5r performance reports. However, some differences exist between the reports available on the different versions of the switch. [Table 1-3](#) shows these differences. Where a report applies only to the Release 5r version of the switch, "n/a" appears in the Release 5si column.

**Table 1-3. Comparison of Release 5si and Release 5r Traffic Reports**

Release 5si Traffic Reports			Release 5r Traffic Reports		
Report	Sub-Report	Type	Report	Sub-Report	Type
aca		Accumulated	aca		Accumulated
attendant	group	YTL <sup>1</sup> -Peak	attendant	group	YTL-Peak
attendant	positions	YTL-Peak	attendant	positions	YTL-Peak
blockage	pn	YTL-Peak	blockage	pn	YTL-Peak
n/a			blockage	sn	YTL-Peak
call-rate		YTL-Peak	call-rate		YTL-Peak
call-summary		Hourly	call-summary		Hourly
cbc-trunk-group		YTL-Peak	cbc-trunk-group		YTL-Peak
communications-links	1-8	Hourly	communications-links	1-8	Hourly
n/a			communications-links	9-16	Hourly
coverage-path		YTL-Peak	coverage-path		YTL-Peak
ds1	log	Accumulated	ds1	log	Accumulated
ds1	summary	Accumulated	ds1	summary	Accumulated
n/a			ds1-facility	log	Accumulated
n/a			ds1-facility	summary	Accumulated
hunt-group		YTL-Peak	hunt-group		YTL-Peak
lar-route-pattern		YTL	lar-rout-pattern		YTL
lightly-used-trunk		YTL	lightly-used-trunk		YTL
load-balance	total	YTL-Peak	load-balance	total	YTL-Peak
load-balance	intercom	YTL-Peak	load-balance	intercom	YTL-Peak
load-balance	incoming	YTL-Peak	load-balance	incoming	YTL-Peak
load-balance	outgoing	YTL-Peak	load-balance	outgoing	YTL-Peak
load-balance	tandem	YTL-Peak	load-balance	tandem	YTL-Peak
modem-pool		YTL-Peak	modem-pool		YTL-Peak
occupancy	busiest- intervals	Accumulated	occupancy	busiest- intervals	Accumulated
occupancy	last-hour	Accumulated	occupancy	last-hour	Accumulated
n/a			occupancy	pktint	Hourly
occupancy	summary	Hourly	occupancy	summary	Hourly
outage-trunk		YTL	outage-trunk		YTL
principal		YTL-Peak	principal		YTL-Peak
route-pattern		YTL	route-pattern		YTL
security-violations	detail	Accumulated	security-violations	detail	Accumulated
security-violations	summary	Accumulated	security-violations	summary	Accumulated

*Continued on next page*

**Table 1-3. Comparison of Release 5si and Release 5r Traffic Reports — Continued**

<b>Release 5si Traffic Reports</b>			<b>Release 5r Traffic Reports</b>		
<b>Report</b>	<b>Sub-Report</b>	<b>Type</b>	<b>Report</b>	<b>Sub-Report</b>	<b>Type</b>
summary		YTL-Peak	summary		YTL-Peak
tone-receiver	summary	YTL-Peak	tone-receiver	summary	YTL-Peak
tone-receiver	detail	YTL-Peak	tone-receiver	detail	YTL-Peak
trunk-group	hourly	Hourly	trunk-group	hourly	Hourly
trunk-group	summary	YTL-Peak	trunk-group	summary	YTL-Peak
wideband-trunk-group	hourly	Hourly	wideband-trunk-group	hourly	Hourly
wideband-trunk-group	summary	YTL-Peak	wideband-trunk-group	summary	YTL-Peak

---

1. YTL = yesterday, today, and last-hour report options available

---

## System Printer and Report-Scheduler

# 2

---

### System Printer

---

The system printer, rather than the slave printer that is attached directly to the management terminal, is used to print those reports that are scheduled. However, when desired and on demand, you may print individual reports using the management terminal printer.

The Report Scheduler feature uses the system printer as its output device. The hardware parameters for the system printer must have been previously administered.

You use Page 4 of the Feature Related System Parameters screen to administer the hardware parameters of the system printer. To access this screen, enter the **change system-parameters features** command. [Screen 2-1](#) depicts this screen. [Table 2-1](#) describes the data fields for this screen.

change system-parameters features

Page 4 of 8 SPE A

FEATURE-RELATED SYSTEM PARAMETERS

SYSTEM PRINTER PARAMETERS

System Printer Extension: 45206 Lines Per Page: 60  
EIA Device Bit Rate: 9600

SYSTEM-WIDE PARAMETERS

Switch Name: System Test 2

MALICIOUS CALL TRACE PARAMETERS

Apply MCT Warning Tone? n MCT Voice Recorder Trunk Group:

**Screen 2-1. Feature Related System Parameters**



**NOTE:**

The system printer must use an Electronic Industries Association (EIA) RS-232 asynchronous serial interface. Depending upon the type/model of serial printer that you use, you may have to administer certain hardware option switch setting as part of the installation procedure.

**Table 2-1. System Printer Hardware Administration**

Field	Description
System Printer Extension:	Enter the extension number if connected to a switched port, or "eia" (see note below). There are two different types of switched port circuits. The TN754 circuit pack supports connections to 7400B-type data modules, while the TN726 circuit pack supports connections to the Asynchronous Data Unit (ADU)-type data module. Local requirements will determine which data link option to select.   <b>NOTE:</b> If your system is a Release 5vs or Release 5si, you may connect the printer to the EIA, unless the EIA is being used for CDR collection.
Lines Per Page:	The number of lines on the computer form. The range is from 24 to 132. Generally, 60 will be the appropriate selection.
EIA Device Bit Rate	1200, 2400, 4800, 9600

## **System Printer Data Link Operation and Maintenance**

Operation and maintenance of the system printer data link is significantly different from the CDR and journal printer data links. For example, the CDR and journal printer data links are maintained in a constant link up state, while the system printer data link is only brought up once every 15 minutes provided there are reports to be printed, or when an immediate report is scheduled.

The system printer data link has three states that identify its operational condition. The states are: (1) link up, (2) link down, and (3) maintenance busy-out. Whenever the communication path (including software processes, hardware cabling, and printer) functions properly and data is exchanged successfully between them, the data link is defined as being in the link up state. The link down state refers to all times except (1) whenever reports are being printed and (2) whenever maintenance personnel have disabled the link. The maintenance busy-out state is the result of executing the **busyout sp-link** command from the management terminal. While in the maintenance busy-out state, the switch software processes and link retry operations are disabled.

It is assumed that all customers will monitor the operating status of the system printer and, as necessary, refill the paper bin, relieve any paper jams, verify that the printer is receiving power, etc.

 **NOTE:**

The BCMS login cannot execute the **busyout sp-link** command. This is normally only performed via the maintenance login. Therefore, as necessary, all non-maintenance personnel should simply flip the printer power switch to the OFF position to refill the paper bin and remove jammed paper. Subsequently, the system-printer can be restored on-line by turning the power switch ON.

If the system printer link generates either a warning alarm or a minor alarm, the problem should be referred to the proper maintenance personnel.

## Report Scheduler

---

The Report Scheduler may be used with many switch features. Specifically, virtually all **list**, **display**, or **test** commands may be executed with the **schedule** qualifier. Therefore, the system administrator login, maintenance login, and other logins may schedule reports.

Whenever a command containing the **schedule** option is executed, it generates a Job Id. A maximum of 50 different Job Ids (50 different reports) can be scheduled for printing. The Report Scheduler feature is used to specify the actual day(s) and time of day that each report will be printed. For a list of measurement commands that can be scheduled, refer to [Table 1-1](#).

## Print Intervals

---

For purposes of printing reports, three print intervals are available:

- **Immediate** — If you select this option, the report will be printed immediately.
- **Scheduled** — If you select this option, the date, time, and day(s) parameters for the report are set administratively. To change them, re-administration is required.
- **Deferred** — If you select this option, the report will be generated once for the time and day specified

## Adding a Report to the Report Scheduler

---

To add a report to the Report Scheduler, enter a **list**, **test**, or **display** command followed by the **schedule** option. Whenever a report is initially scheduled, the print interval of **immediate** is automatically assigned as the default. Therefore, if **immediate** is not desired, the print interval must be changed to **deferred** or

**scheduled** and a day and print time must still be added to the Report Scheduler. [Screen 2-2](#) depicts this screen form with sample data. [Table 2-2](#) describes the data fields for this screen.

```
list measurements attendant group                                Page 1
                                REPORT SCHEDULER
Job Id: 1                                Job Status: none
Command: list measurements attendant-group
Print Interval: immediate
```

**Screen 2-2. Report Scheduler Screen — Immediate Print Interval**

**Table 2-2. Report Scheduler Field Descriptions**

Field	Description
Job Id:	This is a display-only field. Whenever a command is executed with the qualifier <b>schedule</b> , the system responds by generating a unique Job Id number. The Job Id assigned by the system is the lowest number from one to 50 not already used.
Job Status:	This is a display-only field. It identifies the print status of the report. Since the job is not yet on the report scheduler, this field displays "none."
Command:	This is a display-only field. It displays the ACTION, OBJECT, and QUALIFIER entered when the report was scheduled.

*Continued on next page*

**Table 2-2. Report Scheduler Field Descriptions — Continued**

Field	Description
Print Interval:	<p>This field has three options: <b>immediate</b>, <b>deferred</b>, and <b>scheduled</b>. The default is <b>immediate</b>. Whenever the Print Interval: field is changed from <b>immediate</b> to <b>deferred</b> or <b>scheduled</b>, the system responds as appropriate with the word <b>deferred</b> or <b>scheduled</b>. Furthermore, the screen changes to the format depicted in <a href="#">Screen 2-3</a> and the administrator is prompted to enter values for the Print Time: and the days of the week fields.</p> <p> <b>NOTE:</b>                      The <b>deferred</b> option is only used when you want to schedule the report for a single printing. Thereafter, the Job Id is automatically removed from the Report Scheduler. Those reports that are administered as scheduled are printed on a week-after-week basis.</p>
Print Time:	<p>Within a given hour, reports may be scheduled at 15-minute intervals (that is, xx:00, xx:15, xx:30, or xx:45). The system printer requires significant switch processor resources. Therefore, it is important that the reports be scheduled for off-peak hours. Furthermore, the reports should not all be scheduled for the same hour and time interval, but should be staggered across multiple off-peak time intervals.</p> <p>If, because of printing volume or other problems, a report is not printed within 4 hours of its scheduled time interval, it will not be printed until its next scheduled time interval. This is a 4-hour (non-administrable) limit. Immediate and deferred jobs would be removed from the report scheduler under this scenario and would require reentry to print.</p>
Days of Week:	<p>For each day of the week that the report is to be printed, enter <b>y</b> (yes). Enter <b>n</b> (no) for those days when the report should not be printed. Selecting an <b>n</b> for all seven days of the week will effectively disable a report from being printed. The default is <b>n</b>.</p>

```
list measurements attendant groups                                Page 1
                                REPORT SCHEDULER
Job Id: 1                                Job Status: none
Command: list report scheduler
Print Interval: scheduled
Print Time: xx:xx
        Sun: n   Mon: n   Tue: n   Wed: n   Thu: n   Fri: n   Sat: n
```

### Screen 2-3. Report Scheduler Screen — Scheduled Print Interval

Other commands, such as those described in [Chapter 3, "Traffic Data Analysis"](#), are added to the Report Scheduler in a similar manner. Simply append the **schedule** qualifier to the command (for example, **list aca-parameters schedule**, etc.) and, whenever the first screen appears, change the `Print Interval:` field from **immediate** to **scheduled** and subsequently administer the `Print Time:` and the days of the week fields.

### Summary of Steps for Printing Reports on the System-Printer

---

1. Execute a command with the **schedule** qualifier.

The first screen of the Report Scheduler appears (for example, [Screen 2-2](#) with the appropriate command). It indicates that the print interval is immediate.

2. Either (a) press ENTER to print the report (immediately) on the system printer, or (b) since the cursor is on the word `immediate` just type the word `scheduled` or `deferred` and then press ENTER.

#### NOTE:

If you are using a personal computer (PC) running a terminal emulation package, your keyboard may not have an ENTER key. You must map a function key to serve in this capacity. (See your terminal emulation software documentation for instructions on how to do this.)

When you change the print interval to **scheduled** or **deferred**, the `Print Time:` and the days of the week fields are displayed (for example, [Screen 2-3](#) with the appropriate command).

3. Type in the desired Print Time and press ENTER. The cursor is now on the days of the week field. For those days that you desire to print the report, type in a **y**.
4. Press ENTER to execute the command. The system responds with a prompt for the next command.

## Listing Scheduled Reports

To display a list of all reports that are on the Report Scheduler, enter the **list report-scheduler** command. This command displays a list of all reports in the Report Scheduler. The order of the list is according to scheduled print time. Reports will be printed according to this list (for example, first report on the list is the first report printed). [Screen 2-4](#) depicts the screen form for the **list report-scheduler** command. [Table 2-3](#) describes the data fields for this screen.

```
list report-scheduler                                     Page 1 of x

Job Id      Days (smtwtfs)      Report Scheduler      User      Status      Type
Command
4           nynnnnn              18:45                bcms      printing    immediate
list measurements attendant-group
2           nynynyn              19:00                bcms      waiting     scheduled
list measurements call-rate
7           nnnnny              19:15                bcms      waiting     deferred
list bcms agent 5000
23          nnynnn              19:15                bcms      waiting     scheduled
list bcms agent 4000 day 09/11 09/15
```

### Screen 2-4. List Report Scheduler Screen

#### NOTE:

In instances such as those for Job Id 4, if an immediate report is scheduled, the Days field is completed with one **y** for the current day and **n** for all the others.

All fields are display-only. If, after reviewing this report, it is determined that changes need to be made, the **change report-scheduler** command may be used to make the desired changes.

**Table 2-3. Report Scheduler Screen**

Field	Description
Job Id	Whenever a command is executed with the <b>schedule</b> qualifier, the system responds by generating a unique Job Id number. The Job Id assigned by the system is the lowest number from one to 50 not already used.
Days (smtwtfs)	On a per-day basis, an <b>n</b> indicates that the report will not be printed that day; a <b>y</b> indicates that the report will be printed that day. Selecting an <b>n</b> for all seven days of the week will effectively disable a report from being printed.
Time	The time interval that the report is scheduled to be printed.
User	The user login that scheduled the identified report.
Status	Same as Job Status which was described previously. The four possible states are: <ul style="list-style-type: none"> <li>■ Waiting — Means that the report is not scheduled for any activity during the current 15-minute time interval.</li> <li>■ Print-Next — Means that the report is scheduled to be printed within the current 15-minute time interval.</li> <li>■ Printing — Means that the report is currently being printed.</li> <li>■ Printed — Means that the report has been successfully printed during the current 15-minute time interval.</li> </ul>
Type	Indicates the type of print interval that is scheduled for the report.
Command	This field displays the complete command line (excluding the schedule option) that the user entered to produce the identified report.

## Change Command

The **change report-scheduler** command is used to change the schedule of a report. To display this screen form, enter the **change report-scheduler xx** command. The xx corresponds to the Job Id. [Screen 2-5](#) depicts the Change Report Scheduler screen. [Table 2-4](#) describes the data fields for this screen.

```
change report-scheduler 23                                     Page 1
                                     Report Scheduler
Job Id: 23                                           Job Status: printed
Command: list bcms agent 4000 time start 08:00 stop 12:00
Print Interval: scheduled
Print Time: 19:15
  Sun: n   Mon: y   Tue: n   Wed: y   Thu: n   Fri: y   Sat: n
```

**Screen 2-5. Change Report Scheduler**

**Table 2-4. Change Report Scheduler Screen**

Field	Description
Job Id:	This is a display-only field. It is the unique identifier for the report. The Job Id assigned by the system is the lowest number from 1 to 50, not already used.
Job Status:	<p>This is a display-only field. It identifies the print status of the report. The four possible states are:</p> <ul style="list-style-type: none"> <li>■ Waiting — Means that the report is not scheduled for any activity during the current 15-minute time interval.</li> <li>■ Print-Next — Means that the report is scheduled to be printed within the current 15-minute time interval.</li> <li>■ Printing — Means that the report is currently being printed.</li> <li>■ Printed — Means that the report has been successfully printed during the current 15-minute interval.</li> </ul> <p> <b>NOTE:</b>                      The <code>Print Time:</code> and the days of the week fields may be changed and effect a change of the Job Status.</p>
Command:	This is a display-only field. It is the command that is to be executed.

*Continued on next page*

**Table 2-4. Change Report Scheduler Screen — Continued**

Field	Description
Print Interval:	The three possible options are immediate, scheduled, and deferred. If the print time of a report is changed so that its scheduled time now falls inside the current 15-minute time interval (that is, the Job Status field changes from waiting to print-next), the report will not be printed in the current interval. But, the report will be printed during the next scheduled time interval. As a contrast, if a report that is scheduled for some time interval (other than the current 15-minute time interval) has its print interval changed from scheduled to immediate, the report will be printed immediately.
Print Time:	Within a given hour reports may be scheduled at 15-minute intervals (that is xx:00, xx:15, xx:30, xx:45). This field may be changed as desired. The system printer requires significant switch processor resources. Therefore, it is important that the reports be scheduled for off-peak hours. Furthermore, the reports should not all be scheduled for the same hour and time interval, but should be staggered across multiple off-peak time intervals. If, because of printing volume or other problems, a report is not printed within four hours of its scheduled time interval, it will not be printed until its next scheduled time interval. This is a 4-hour (non-administrable) limit.
Days of Week	On a per-day basis, an <i>n</i> indicates that the report will not be printed for that day; a <i>y</i> indicates that the report will be printed for that day. This field may be changed as desired. Selecting an <i>n</i> for all seven days of the week will effectively disable a scheduled printing of a report.

## **Remove Command**

The **remove report-scheduler** command is used to remove a report from the Report Scheduler. To display this screen, enter the **remove report-scheduler xx** command. The xx corresponds to the Job Id. [Screen 2-6](#) depicts this screen. [Table 2-5](#) describes the data fields for the screen.

```
remove report-scheduler 23                                     Page 1
                                     Report Scheduler
Job Id: 23                                           Job Status: printed
Command: list bcms agent 7000 time start 08:00 stop 12:00
Print Interval: scheduled
Print Time: 19:15
Sun: n   Mon: y   Tue: n   Wed: y   Thu: n   Fri: y   Sat: n
```

## Screen 2-6. Remove Report Scheduler

### NOTE:

All fields are display-only. Once the user has verified that the identified report is the one to be removed, it is then necessary to press RETURN. Following this action, the system waits for the next command.

**Table 2-5. Remove Report Scheduler Command Screen**

Field	Description
Job Id	The unique identifier for the report. The Job Id assigned by the system is the lowest number from one to 50 not already used.
Job Status	Identifies the print status of the report. The four possible states are: <ul style="list-style-type: none"> <li>■ Waiting — Means that the report is not scheduled for any activity during the current 15-minute time interval.</li> <li>■ Print-Next — Means that the report is scheduled to be printed within the current 15-minute time interval.</li> <li>■ Printing — Means that the report is currently being printed.</li> <li>■ Printed — Means that the report has been successfully printed during the current 15-minute interval.</li> </ul>
Command	The command associated with the Job Id that is being removed.
Print Interval	The three possible options are immediate, scheduled, and deferred.
Print Time	Within a given hour, reports may be scheduled at 15-minute intervals (for example, xx:00, xx:15, xx:30, xx:45).
Days of Week	On a per-day basis, an <b>n</b> indicates that the report will not be printed for that day; a <b>y</b> indicates that the report will be printed that day. Selecting an <b>n</b> for all seven days of the week will effectively disable a report from being printed.

# Traffic Data Analysis

# 3

## How This Chapter Is Organized

This chapter describes all of the traffic measurement reports, excluding processor occupancy and security reports. The reports are in alphabetical order. Each report description includes the following elements:

- An explanation of the report
- The full form for the command used to call up the report (elements of the command may be abbreviated as long as they are unique), including a description of any options
- An illustration of a typical report screen
- A table that defines all field labels in the report and, when appropriate, a "Suggested Actions" list

The following reports are provided:

- **Attendant.** Describes the traffic measurements and performance reports for attendant groups and attendant positions and provides the analysis of the data provided in the reports.
- **Automatic Circuit Assurance.** Describes the parameters and measurements reports for the ACA feature.
- **ARS/AAR/UDP Route Pattern Measurements.** Describes the measurements selection form and routing pattern measurements report for the ARS, AAR, and UDP features and provides the analysis of the data provided in the measurements report.
- **Call Rate.** Describes the Call Rate measurements and summary reports available with DEFINITY systems.
- **Call Summary.** Lists the number of completed calls for the last 24 hours.

- **Call Coverage Measurements.** Describes the Principal Coverage and Coverage Path measurement reports available with DEFINITY systems.
- **DS1 Link Performance Measurements.** Describes performance measurements for DS1 links. The reports available include detailed log and summary reports.
- **DS1 Converter Link Performance Measurements.** Describes performance measurements for DS1 Converter links. The reports available include detailed log and summary reports.
- **Hunt Groups.** Describes the traffic measurements, performance, and status reports for Automatic Call Distribution (ACD)/Uniform Call Distribution (UCD)/Direct Department Calling (DDC) Hunt Groups and provides the analysis of the data provided in the reports.
- **LAR Route Pattern Measurements.** Describes the route pattern measurements report for the Look Ahead Routing feature.
- **Modem Pool Groups.** Describes the traffic measurements report for modem pool groups.
- **Performance Summary.** Describes the traffic measurements Performance Summary Report.
- **Port Network /Load Balance.** Describes the Blockage Study Report which provides information on loading and blocking for each port network as well as between switch node pairs; and the Load Balance Report which gives information on load and balance for each port network and indications of the source of the load.
- **System Status.** Describes the System Status Reports, which provide an overall view of how the system is performing.
- **Tone Receiver.** Describes the Tone Receiver Summary and Tone Receiver Detailed Measurements Reports which display traffic data for tone receivers.
- **Traffic Summary.** Describes the traffic measurements Summary Report.
- **Trunk Groups.** Describes the traffic, outage, lightly used and measurements/selection reports, call-by-call (CBC), performance and status reports for Trunk Groups; it also provides the validation and analysis of the data provided in the reports.
- **Wideband Trunk Groups.** Describes the Wideband Trunk Group Summary and Hourly reports and the Wideband Trunk Group Selection screen.

## **General Information about Reports**

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### **Report Screens**

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#### **The Switch Name Field**

The `Switch Name:` field appears at the top left of all the traffic data analysis screens, just below the command. The field value is a 20-character string administered by the customer that uniquely defines the switch being measured.

#### **Time and Date Fields**

The time and date that the report was requested are displayed at the top right.

When a question mark appears in the time fields, three possible explanations exist.

1. The attendant presses start immediately followed by pressing cancel.
2. Pressing start and letting calls time-out after ten seconds.
3. No staffing, but making calls.

#### **The Measurement Hour Field**

The `Measurement Hour` is the starting time (using a 24-hour clock) of the hour during which the data was recorded.

#### **Changing the Time**

If you change the time, the hour in which the time was changed will be shown on the measurements reports as `hh**`.

## **Attendant Group Reports**

---

The Attendant Group Reports are used to assess the quality of service being provided to customers calling through the Listed Directory Numbers, and to facilitate the management of the attendant group so that it is neither under- nor over-staffed.

The Attendant Group Measurements consist of two reports: The Attendant Group Report provides hourly traffic measurements for the Attendant Group as a whole. The Attendant Positions Report gives peak individual Attendant Position Measurements.

Both reports are available as PEAK reports for yesterday's peak hour, today's peak hour, and the last hour. A peak hour is the hour within a 24-hour period that had the greatest usage (Time Talk plus Time Held) for the specified day.

Hourly data for the entire attendant group can be obtained by polling the Attendant Group Report on an hourly basis.

## Attendant Group Report

### Command

To display the Attendant Group Report, enter:

**list measurements attendant group [print/schedule]**

### Screens

[Screen 3-1](#) shows a typical screen for the Attendant Group Report. [Table 3-1](#) describes the data fields presented in the Attendant Group Report screen.

```
list measurements attendant group                               SPE A
Switch Name: Cust_Switch_Name                               Date: 4:47 pm WED NOV 27, 19xx
ATTENDANT GROUP MEASUREMENTS
Grp Meas ----- Calls ----- Time ---- Time Speed
Siz Hour  Ans  Abnd  Qued H-Abd Held Avail Talk Held Abnd Ans(sec)
 0     0     0    0    0    0    0    0    0    0    0    0    YEST PEAK
10    1200 1006 0    0    0    0    212 76  0    0    0    TODAY PEAK
10    1500 1007 0    0    0    0    224 64  0    0    1    LAST HOUR
```

**Screen 3-1. Attendant Group Report**

**Table 3-1. Attendant Group Report**

Field	Description
Grp Siz	<i>Group Size.</i> The number of attendant positions (consoles) that are administered for the groups.
Meas Hour	<p><i>Measurement Hour.</i> The hours represented are indicated by the labels in the right-hand column (the hours of yesterday's peak activity, today's peak activity, and the last hour activity).</p> <p><b>⇒ NOTE:</b>                      A pair of asterisks in the minute portion of the measurement hour indicates that the switch time was changed during the measurements interval. All measurement data for this interval is set to zero.</p>
Calls Ans	<p><i>Calls Answered.</i> The number of calls answered by all active attendants during the measurement hour. With Total Usage and Calls Answered, you can determine the Average Work Time (AWT), which is the time it takes an attendant to handle a call (refer to <a href="#">"Data Analysis Guidelines" on page 3-14</a>).</p> <p>Calls placed to individual attendant extensions or that route to an attendant via a hunt group do not increment the <i>Calls Ans.</i> counter.</p>
Calls Aband	<p><i>Calls Abandoned.</i> The number of calls that ring an attendant group and drop (the caller hangs up) before an attendant answers. Where applicable, this total includes calls abandoned from the attendant queue before being answered. A call abandoned after being placed on hold is <i>not</i> included in this measurement, because it has already been added to the calls answered measurement.</p> <p><b>Suggested Action:</b> Observe times during which the calls abandoned number may be higher than desirable, and then schedule additional attendants in the group as needed during the indicated times. Also, see "Percent Occupancy," which is located under <a href="#">"Data Analysis Guidelines" on page 3-14</a>.</p>

**Continued on next page**

**Table 3-1. Attendant Group Report — Continued**

Field	Description
Calls Queued	<p><i>Calls Queued.</i> The total number of calls that were placed in the attendant queue (delayed) because no attendants were available. Calls remain in the queue:</p> <ul style="list-style-type: none"> <li>■ Until an attendant becomes available and the call is connected.</li> <li>■ Until the caller, while waiting in the queue, abandons the call (hangs up) before an attendant is available. See "Suggested Action" in the description of the <a href="#">Calls Aband</a> field.</li> <li>■ The call covers to another point in a coverage path.</li> </ul>
Calls H-Abd	<p><i>Calls Held-Abandoned.</i> The number of calls that abandon while the caller is in hold mode. Held calls which time out and re-alert are included in the held-abandoned call count.</p> <p><b>Suggested Action:</b> If this number is determined to be excessive, you should investigate and attempt to identify the reasons.</p>
Calls Held	<p><i>Calls Held.</i> The number of calls that are answered by the attendant group, and subsequently placed on hold by the attendant group.</p>
Time Avail	<p><i>Time Available.</i> The time during which the "pos avail" lamp is lit on all attendant consoles, and the attendants are not talking on calls but are available to handle new calls. Measured in Centum (Hundred) Call Seconds or CCS.</p> <p><b>⇒ NOTE:</b>                  An attendant can have calls on hold and still be available.</p> <p>For example, if two attendants are available for 15 minutes each during the measurement hour, the total available time would be 30 minutes or 18 CCS (0.5 hour X 36 CCS per hour).</p>

*Continued on next page*

**Table 3-1. Attendant Group Report — Continued**

Field	Description
Time Avail (cont.)	<p>Consoles may be administered either (a) with their own unique extension number, or (b) without any extension number. For the "with extension number" case, traffic measurements for outgoing calls and incoming calls to the extension are allotted to the console's extension number and not to the attendant group. For the "without" case, all traffic measurements are allotted to the attendant group. The time that the console is on outgoing calls will not be included in the attendant group's Time Avail measurement.</p> <p>Attendants are not available and do not accumulate time available when:</p> <ul style="list-style-type: none"> <li>■ The position is in Night Service</li> <li>■ The position was busied-out</li> <li>■ The headset is unplugged</li> <li>■ The attendant is servicing a call</li> </ul> <p><b>Suggested Actions:</b></p> <ol style="list-style-type: none"> <li>1. If the Time Avail plus Time Talk fields total to a number less than 36 CCS X the number of attendants, then some of the attendant positions were not staffed for the measurement hour. If this is a problem, then it is appropriate to staff additional positions during the busy hour(s).</li> <li>2. If the Time Avail plus Time Talk fields equal 36 CCS X the number of attendants, then any time available is idle time or time not spent on calls. A large number for the Time Avail field indicates a low occupancy. If this is a problem, then it is appropriate to reduce the number of attendant positions that are staffed. Staffed time is usually very close to the sum of the Time Avail and Time Talk fields</li> </ol>

*Continued on next page*

**Table 3-1. Attendant Group Report — Continued**

Field	Description
Time Talk	<p>Also referred to as <i>Talk Time</i>. It is the total time, during the measurement interval, that attendant(s) were active or talking on a loop (measured in CCS).</p> <p>Talk time is not started until the call is answered by the attendant. The duration of time between the call terminating at the attendant console and when the call is answered is not accumulated as either <i>Avail Time</i> or <i>Talk Time</i>.</p> <p>Calls that are split by the attendant do not accumulate talk time from the point when the attendant presses the start button until the call is placed.</p> <p>Calls that route to an attendant via a hunt group are treated as calls to the attendant extension and therefore do not accumulate talk time.</p> <p><b>⇒ NOTE:</b>                      An attendant can have up to six calls on hold at any one time. However, each attendant can only be active on one loop at a time.</p> <p><b>Suggested Action:</b> If talk time is acceptable, but one or more of the other measurements are unacceptable, then all parameters should be studied in order to identify what should be changed (the number of consoles, number of attendant positions staffed, attendants schedule, faulty trunks, and so on).</p>

*Continued on next page*

**Table 3-1. Attendant Group Report — Continued**

Field	Description
Time Held	Also referred to as <i>Held Time</i> . The total amount of time (measured in seconds) that the attendants have calls on hold.
Time Abnd	<p>Also referred to as <i>Time to Abandoned</i>. The average amount of time that calls spend in queue and/or ringing at the console before the callers hang up (measured in seconds).</p> <p><b>⇒ NOTE:</b>                      Time to abandoned does not include calls that overflow the attendant group queue.</p> $\text{Time To Abandoned} = \frac{\text{Total Delay For All Abandoned Calls (in seconds)}}{\text{Total Number of Calls Abandoned}}$ <p><b>Suggested Action:</b> If the Time to Abandoned number is smaller than the Speed of Answer number then you will need more agents. As a contrast, if the Time to Abandoned number is larger than the Speed of Answer number, then the attendant group should process the calls faster. <b>The attendant group should be engineered so that “Time to Abandoned” approximately equals “Avg Delay”.</b></p> $\text{Total Delay} = (\text{Time To Abandoned}) \times (\# \text{ of Abandoned Calls}) + (\text{Speed of Answer}) \times (\# \text{ of Calls Answered})$ $\text{Avg Delay} = \frac{\text{Total Delay}}{\text{Calls Answered} + \text{Calls Aband}}$ <p><b>⇒ NOTE:</b>                      If the average time to abandon is equal to or exceeds 9999 seconds, the value 9999 displays in the field.</p>

*Continued on next page*

**Table 3-1. Attendant Group Report — Continued**

Field	Description
Speed Ans (Sec)	<p data-bbox="335 290 1071 383"><i>Speed of Answer.</i> The average elapsed time from when a call terminates at the attendant group to when the call is answered by an attendant (measured in seconds).</p> <p data-bbox="335 401 1071 494">The average time calls wait to ring an attendant (Queue Usage / Calls Answered). The Queue Usage is the total time that calls spend in the Attendant Queue.</p> <p data-bbox="335 526 486 559"><b>⇒ NOTE:</b></p> <p data-bbox="403 562 1071 655">Calls terminate either (1) directly to an attendant console and subsequently begin ringing, or (2) in the attendant queue when there are no attendant positions available.</p> <p data-bbox="403 677 637 709"><i>Speed of Answer</i> =</p> $\frac{\text{Total Delay For All Answered Calls (in seconds)}}{\text{Total Number of Calls Answered}}$ <p data-bbox="335 856 486 888"><b>⇒ NOTE:</b></p> <p data-bbox="403 892 1035 956">If the average time to abandon is equal to or exceeds 9999 seconds, the value 9999 displays in the field.</p> <p data-bbox="335 989 1068 1214"><b>Suggested Action:</b> If this number appears to be too high and all attendants are working at acceptable efficiency levels, consider additional training that may help the attendants complete calls more quickly. Alternatively, observe the hours during which speed of service becomes unacceptable and consider adding consoles and staffing additional attendants during those hours.</p>

## Attendant Positions Report

The Attendant Positions Report provides hourly individual attendant position measurements. It is used to assess personnel performance, and to identify when additional training may be necessary.

## Command

To display the Attendant Positions Report, enter:

**list measurements attendant positions [print/schedule]**

**Options:** The print and schedule options are available for this command.

## Screens

[Screen 3-2](#) and [Screen 3-3](#) show a typical Attendant Positions Report. [Table 3-2](#) describes the data presented in the Attendant Positions Report screen.

```
list measurements attendant positions
Switch Name: Customer_Switch_Name          Date: 4:46 pm WED NOV 27, 19xx

                ATTENDANT POSITIONS MEASUREMENTS
Yesterday's Peak          Today's Peak          Last Hour
Meas Hour: 0             Meas Hour: 1200     Meas Hour: 1500
Attd ----- Time ----- Calls ----- Time ----- Calls ----- Time -----
ID  Avail  Talk  Held  Ans  Avail  Talk  Held  Ans  Avail  Talk  Held  Ans
1   0      0    0    0    0     0    0    0    0     0    0    0    0
2   0      0    0    0    0     0    0    0    0     0    0    0    0
6   0      0    0    0    27    9    0    127  28    8    0    126
7   0      0    0    0    26   10    0    125  28    8    0    126
8   0      0    0    0    26   10    0    125  28    8    0    126
9   0      0    0    0    26   10    0    125  28    8    0    126
10  0      0    0    0    27    9    0    126  28    8    0    126
15  0      0    0    0    26   10    0    126  28    8    0    125

press CANCEL to quit -- press NEXT PAGE to continue
```

### Screen 3-2. Typical Attendant Positions Report — Page 1

```
list measurements attendant positions
Switch Name: Customer_Switch_Name          Date: 4:46 pm WED NOV 27, 19xx
Page 2

                ATTENDANT POSITIONS MEASUREMENTS
Yesterday's Peak          Today's Peak          Last Hour
Meas Hour: 0             Meas Hour: 1200     Meas Hour: 1500
Attd ----- Time ----- Calls ----- Time ----- Calls ----- Time -----
ID  Avail  Talk  Held  Ans  Avail  Talk  Held  Ans  Avail  Talk  Held  Ans
20  0      0    0    0    27    9    0    126  28    8    0    126
25  0      0    0    0    27    9    0    126  28    8    0    126
```

### Screen 3-3. Typical Attendant Positions Report — Page 2

**Table 3-2. Attendant Positions Report**

Field	Description
Attd ID	A number between 1 and the maximum number of attendants to identify which attendant's data is being displayed. This number is chosen by the user upon administering this attendant.
Time Talk	The time the attendant is active on calls (in CCS). Time Talk is measured from the time the attendant activates an attendant loop until the loop is released. If more than one loop is active on an attendant console at one time, the usage is counted only once; i.e., one attendant is not counted as being busy more than once at a single time.
Time Held	The time the attendant had calls on hold (measured in seconds).
Time Avail	The total time the subject attendant is available to receive calls during the polling interval (measured in CCS).
Calls Ans	The total number of calls answered by this attendant (measured in CCS). Calls placed to an individual attendant extension or that route to an attendant via a hunt group do not increment the <i>Calls Ans.</i> counter.

## Attendant Group Performance Report

The Attendant Group Performance Report gives the console attendant group average speed of answer for each hour of a 24-hour period, for either yesterday or today.

### Command

To display the Attendant Group Performance Report, enter:

**list performance attendant-group [option] [print/schedule]**

**Options:** Options are **today** for today's report or **yesterday** for yesterday's report.

### Screen

[Screen 3-4](#) and [Screen 3-5](#) show typical screens for the Attendant Group Performance Report, using the **yesterday** option.

3 Traffic Data Analysis

Attendant Group Performance Report

Page 1 of the display shows hours from 0000 (midnight) through 1100 (11:00 am), and Page 2 shows hours from 1200 (noon) through 2300 (11:00 pm). As shown at the bottom of Page 1, press CANCEL to exit the Attendant Group Performance Report, or press NEXT PAGE to see the second page.

[Table 3-3](#) describes the data presented in the Attendant Group Performance Report.

```
list performance attendant-group yesterday                               Page 1
Switch Name: Customer_Switch_Name      Date: 1:58 pm  THU MAR 29, 19xx
                                ATTENDANT SPEED OF ANSWER
Meas -----Average Speed of Answer (sec) ----- Speed
Hour  1  2  3  4  5  6  7  8  9  10 15  20  30  40  50  100  200  Ans(sec)
0                                           0
100                                          0
200                                          0
300                                          0
400                                          0
500                                          0
600                                          0
700  ///////////////                          3
800  ////////////////                          5
900  ////////////////                          5
1000 ////////////////                          5
1100 ////////////////                          7
                                press CANCEL to quit --  press NEXT PAGE to continue
```

Screen 3-4. Attendant Group Performance Report — Page 1

```
list performance attendant-group yesterday                               Page 2
Switch Name: Customer_Switch_Name      Date: 1:58 pm  THU MAR 29, 19xx
                                ATTENDANT SPEED OF ANSWER
Meas -----Average Speed of Answer (sec) ----- Speed
Hour  1  2  3  4  5  6  7  8  9  10 15  20  30  40  50  100  200  Ans(sec)
1200 ////////////////                          6
1300 ////////////////                          5
1400 ////////////////                          17
1500 ////////////////                          5
1600 ////////////////                          9
1700 ////////////////                          2
1800                                          0
1900                                          0
2000                                          0
2100                                          0
2200                                          0
2300                                          0
Command successfully completed
Command:
```

Screen 3-5. Attendant Group Performance Report — Page 2

**Table 3-3. Attendant Group Performance Report**

Field	Description
Meas Hour	<i>Measurement Hour.</i> The starting time (using the 24-hour clock) of the hour during which the data was recorded.
Average Speed of Answer (sec)	<i>Speed of Answer</i> in seconds. A graphic display of the average time taken by attendants to answer calls.
Speed Ans (sec)	<i>Speed of Answer.</i> The average speed of answer is also displayed numerically in seconds for each hour in the report interval.  <b>Suggested Action:</b> If this number appears to be too high and all attendants are working at acceptable efficiency levels, consider additional training that may help the attendants complete calls more quickly. Alternatively, observe the hours during which speed of answer becomes unacceptable and consider adding consoles and scheduling more attendants during those hours.

### Data Analysis Guidelines

The following guidelines are intended to show an easy method for determining whether currently reported data is acceptable or not. These guidelines represent the minimum that you should do to verify that the recorded measurement values are consistent with expected and historic values. You should perform additional checks as necessary.

To check the acceptability of hourly Attendant Group Measurements Reports, verify the following:

- The system clock or group size have not been changed during the measurement hour. If the system clock has been changed, the minutes field will display double asterisks (for example, 11\*\*) and all other fields (for the indicated time interval) will display zero.
- The AWT typically ranges between 10 and 30 seconds per call (different values may be acceptable for specific applications).

**⇒ NOTE:**

Time Talk (in CCS) plus Time Avail (in CCS) should not exceed 36 X the group size. For example, with two attendant positions, this should not exceed 2 X 36 = 72 CCS for data collection.

**⇒ NOTE:**

The attendant can have up to six calls on hold at one time.

## Analyzing the Report Data

---

To use the Attendant Group Measurements Reports to estimate the number of attendant positions for the application, you will need additional data. The additional data needed can be calculated using data from the reports which you have subsequently recorded on the Worksheet 1. The following paragraphs describe how to use data from the completed Worksheet 1 to evaluate Average Work Time, Staffed Time, Attendant Offered Load, Percent Occupancy, and Percent of Calls Queued.

**⇒ NOTE:**

The Attendant Group Data Worksheet serves to backup the data from the reports and to provide an easy means for identifying the peak hour. The data from the identified peak hour should be used in subsequent calculations.

## Average Work Time

The Average Work Time (AWT) is the average number of seconds it takes attendants to process calls. The number of calls answered and the total time the attendants are busy handling these calls (Talk Time) are used to determine the AWT.

To determine AWT, use the figures for Talk Time, Time Held (provided that time held is considered to be a part of the agent's normal work time), and Calls Answered from the measurements report in the following equation:

$$AWT = \left[ \frac{\text{Talk Time} + \text{Time Held CCS}}{\text{Calls Answered}} \right] \times \left[ \frac{100 \text{ Seconds}}{\text{CCS}} \right]$$

**Example:**

The typical report screen shown earlier in this section (see [Screen 3-1](#)) lists the following data for yesterday's peak hour:

- Time Talk = 43 CCS or 4300 seconds
- Time Held = 4 CCS or 400 seconds
- Calls Answered = 170

Using these figures as an example, the average work time is:

$$AWT = \left[ \frac{43 \text{ CCS} + 4 \text{ CCS}}{170 \text{ calls}} \right] \times 100 \text{ Seconds} = 27.6 \text{ Seconds per call}$$

## Staffed Time

Staffed time is the time that the attendant positions are active (ready for calls). If staffed time (per agent) equals 36 CCS, then all agents were active for the full hour. Using [Screen 3-1](#) as an example, staffed time per agent is:

$$\text{Staffed Time (per Agent)} = \frac{\text{Time Available} + \text{Talk Time}}{\# \text{ of Agents}}$$

$$\text{Staffed Time (per Agent)} = \frac{29 \text{ CCS} + 43 \text{ CCS}}{2} = 36 \text{ CCS}$$

## Attendant Offered Load

The Attendant Offered Load (AOL) is the sum of the Calls Answered plus Calls Abandoned times the AWT (Average Work Time). You can determine the AOL with the following equation:

$$AOL \text{ (in seconds)} = (\text{Calls Ans} + \text{Calls Aband}) \times AWT \text{ in seconds}$$

$$AOL \text{ (in CCS)} = \frac{AOL \text{ in seconds}}{100}$$

### Example:

The typical report screen shown earlier in this section (see [Screen 3-1](#)) lists the following data for yesterday's peak hour:

- Calls Answered = 170
- Calls Abandoned = 3

And from the calculations in the previous example:

- AWT = 27.6 Seconds

## Percent Occupancy

The occupancy level may be expressed as a function of (a) the total time of the measurement hour, or (b) a function of the time the positions were active and attended. Generally, it is expected that all positions will be staffed 100 percent of the time during the peak busy hour. Therefore, the measurement Percent Occupancy (total time) is sufficient in most instances.

Assuming that attendant positions are staffed 100 percent of the time, then each position can handle 36 CCS of load during the peak hour. Therefore, based upon the calculated AOL of 47.75 CCS, two attendant positions are required.

The two status reports **monitor system view1** and **monitor system view2**, may be used to display status of the attendant console positions. Specifically, you can use these two reports to determine, on an instantaneous basis, how many attendant positions are activated, and the identifying number of those that are deactivated.

### NOTE:

Since the **monitor system view1** and **view2** commands not only display status of the attendant consoles but also maintenance and traffic status, they are included in this chapter under the heading System Status.

For this example, the percent occupancy is calculated as follows:

$$\textit{Maximum Possible Usage} = 36 \textit{ CCS} \times \textit{Total \# of Members}$$

**Suggested Actions:** You should staff a sufficient number of positions so that the attendants are neither underworked nor overworked. If the percent occupancy is high and the time available (from the Worksheet) is low, the recommendation is to staff another attendant position. If the percent occupancy is low and the time available (from the worksheet) is high, the recommendation is to staff fewer attendant positions.

### NOTE:

The Percent Occupancy should not exceed 92% (even on large systems with several attendant consoles). The 92% is a human factors limitation and does not apply to hardware servers.

The formula for calculating "Percent Occupancy (attended)" is as follows:

$$\textit{Percent Occupancy (attended)} = \frac{\textit{AOL}}{\textit{Time Avail} + \textit{Time Talk}} \times 100$$

Whenever all positions of the attendant group are staffed, the equation for percent occupancy (attended) will yield the same results as the equation for percent occupancy (total time).

## Percent of Calls Queued

As the percent of calls queued increases, the speed of Ans field will also increase. Callers are more likely to become frustrated as they are delayed and more likely to abandon their calls, thus contributing to the perception that the level of service has decreased.

Percent of Calls Queued (or delayed) is defined as follows:

$$\% \text{ Queued} = \frac{\text{Calls Queued}}{\text{Calls Ans} + \text{Calls Aband}}$$

$$\% \text{ Queued} = \frac{78 \text{ calls}}{170 \text{ calls} + 3 \text{ calls}} = \frac{78 \text{ calls}}{173 \text{ calls}} = 45\%$$

## Analyzing Customer Supplied (Theoretical) Data

For an installed system, the measurement reports are always recommended over theoretical data derived from traffic tables. However, it is recognized that there will be occasions when the use of traffic tables is necessary and desirable. For example, as a part of responding to a request for proposal (RFP), a potential customer may supply certain traffic data that is obtained independent of the switch, and request that the RFP include calculations indicating how well the switch will accommodate the specified traffic. It may also be desirable to use traffic tables during the system engineering and planning stage.

### NOTE:

Traffic Engineering Capacity tables such as the Erlang-C Infinite Queue, Erlang-C Finite Queue, and Retrial Capacity are used for data analysis when necessary. Traffic Engineering Capacity tables are based on mathematical models in which certain assumptions are made about call arrivals, the serving process, and the disposition of blocked calls.

## Speed of Answer

Given the appropriate variables, you can estimate the Speed of Answer. You need the following:

- Erlang-C Infinite Queue Capacity tables (found in *Basic Traffic Analysis*)
- AWT (Average Wait Time)
- Number of Attendant Positions Staffed (Working Servers)
- AOL, where: AOL = (Calls Ans + Calls Aband) X AWT

### Example:

Given the following data, estimate the Speed of Answer:

- Time Talk = 43 CCS

- Time Held = 4 CCS
- Calls Answered = 170
- Using Time Talk, Time Held, and Calls Answered, the calculations indicate that AWT= 27.6 Seconds
- Number of Attendant Positions Staffed = 2
- Calls Abandoned = 3
- Using Calls Answered, Calls Abandoned, and AWT, the calculations indicate that AOL = 47.83 CCS
  1. In the table shown in [Figure 3-1](#), locate the row that corresponds to two attendant positions (working servers).
  2. Read across to find the offered load closest to 47.83 CCS. (The closest is 46.2 CCS, when rounding up.)
  3. Read up to find the Average Delay in Multiples of Average Holding Time that corresponds to 46.2 CCS (for this example, the Average Delay in Multiples of Average Holding Time is .700).
  4. Estimate the theoretical Speed of Answer by multiplying the Average Delay in Multiples of Average Holding Time by AWT (that is, Speed of Answer = .7 X 27.6 seconds = 19.3 seconds).



**NOTE:**

This example implies that all calls will have an average of 19.3 seconds delay. Some of the calls are answered immediately, while the remaining calls are delayed. To find the portion of calls that experience a delay before service can be estimated, use the table shown in [Figure 3-2](#). The average delay of these calls can be estimated using the table shown in [Figure 3-3](#).

SERVERS	AVERAGE DELAY IN MULTIPLES OF AHT THAT CORRESPONDS TO 34.2 CCS			AVERAGE HOLDING TIME												SERVERS				
	.001	.005	.010	.30	.200	.250	.300	.350	.400	.450	.500	.700	1.00	2.00						
1	0.0	0.2	0.8	.7	4.0	7.2	8.3	9.3	10.3	11.2	12.0	13.0	14.0	15.0	16.0	17.0	18.0	19.0	20.0	1
2	2.3	5.1	7.7	.0	29.8	32.2	34.6	36.7	38.9	40.1	41.4	42.7	44.0	45.3	46.6	47.9	49.2	50.5	51.8	2
3	9.7	14.0	21.1	.2	50.0	41.9	43.1	47.6	70.1	72.2	74.1	79.2	83.3	88.2	93.2	98.2	103.2	108.2	113.2	3
4	21	33	41	.3	69	69	93	97	120	103	104	108	118	130	130	130	130	130	130	4
5	30	32	41	1.8	130	124	130	131	137	139	142	142	142	143	143	143	143	143	143	5
17	1167	1294	1331	322	1380	1338	1369	1369	1402	1413	1421	1429	1433	1436	1436	1436	1436	1436	1436	17
18	1216	1331	1389	367	1373	1369	1403	1428	1438	1449	1457	1463	1469	1472	1472	1472	1472	1472	1472	18
19	1289	1363	1416	402	1410	1428	1481	1480	1478	1488	1493	1499	1502	1502	1502	1502	1502	1502	1502	19
20	1360	1394	1433	437	1484	1480	1474	1494	1510	1520	1524	1533	1541	1541	1541	1541	1541	1541	1541	20

Figure 3-1. Estimating the Speed of Answer

5. To determine the percentage of calls that experience a delay, use the Average Delay in Multiples of Average Holding Time that is closest to the expected AOL.
  - a. In the Erlang-C Infinite Queue Capacity table shown in [Figure 3-1](#), locate the row that corresponds to two working servers.
  - b. Read across until you find the value closest to the expected AOL (the value closest to 47.83 CCS is 46.2 CCS).
  - c. Read up to find the Average Delay in Multiples of Average Holding Time that corresponds to 46.2 CCS (the Average Delay in Multiples of AHT is .700).
  - d. In the Erlang-C Probability of Delay table shown in [Figure 3-2](#), find the .700 column.
  - e. Read down this column until it intersects the row with two servers. The value at the intersection is .502, which represents the probability of delay. This value shows that 50.2 percent of the calls experience some delay before being answered.

PROB	AVERAGE DELAY (MULTIPLES OF AHT)				AVERAGE HOLDING TIME												PROB
	.001	.005	.010	.020	.100	.200	.300	.400	.500	.600	.700	.800	.900	1.00	2.00		
1	.001	.005	.010	.020	1.30	1.47	1.60	1.71	1.80	1.88	1.95	2.00	2.05	2.10	2.15	2.20	
2	.002	.009	.018	.036	1.92	2.27	2.74	3.12	3.48	3.72	3.99	4.23	4.44	4.62	4.78	4.92	
3	.003	.013	.028	.056	2.28	2.90	3.52	3.90	4.26	4.51	4.77	5.00	5.20	5.37	5.52	5.66	
4	.004	.016	.033	.066	2.77	3.31	3.94	4.33	4.60	4.85	5.09	5.31	5.51	5.68	5.83	5.97	
5	.005	.020	.040	.080	3.38	3.93	4.56	4.95	5.22	5.47	5.70	5.91	6.10	6.27	6.42	6.56	
17	.018	.053	.099	1.50	3.02	3.73	4.21	4.59	4.90	5.16	5.37	5.56	5.73	5.89	6.05	6.19	
18	.018	.053	.099	1.50	3.12	3.74	4.23	4.61	4.92	5.18	5.39	5.58	5.75	5.91	6.07	6.21	
19	.018	.054	.094	1.48	3.13	3.74	4.24	4.63	4.93	5.20	5.41	5.59	5.76	5.92	6.08	6.22	
20	.018	.054	.097	1.48	3.17	3.80	4.29	4.68	4.98	5.24	5.45	5.63	5.80	5.96	6.12	6.26	

AVERAGE DELAY (MULTIPLES OF AHT) (.700)

ESTIMATED PROBABILITY OF DELAY (.502)

Figure 3-2. Estimating the Percentage of Delayed Calls

6. To determine the Average Delay of the Delayed Calls, proceed as follows:
  - a. In [Figure 3-3](#), locate the .700 column.
  - b. Read down this column until it intersects the row with two servers. (The value at the intersection is 1.40. This is the Average Delay of Delayed Calls in Multiples of Average Holding Time).
  - c. To obtain the Average Delay of Delayed Calls in seconds, multiply the Average Holding Time by 1.40 (1.40 X 27.6 seconds = 38.6 seconds).

In summary, when two attendant positions are provided to accommodate 173 calls during the busy hour, the speed of answer for all calls is 19.3 seconds. While 49.8 percent of the calls are answered immediately, the remaining 50.2 percent will have an average delay of 38.6 seconds.

PRIORITY	AWT				AVERAGE DELAY - AVERAGE HOLDING TIME										PRIORITY						
	.001	.005	1.01	1.03	1.30	1.30	1.30	1.30	1.30	1.30	1.30	1.30	1.30	1.30		1.30	1.30	1.30	1.30	1.30	
1	0.17	0.49	1.01	1.03	1.13	1.30	1.30	1.30	1.30	1.30	1.30	1.30	1.30	1.30	1.30	1.30	1.30	1.30	1.30	1.30	
2	0.38	0.38	0.38	0.38	0.70	0.68	0.90	0.94	1.02	1.07	1.13	1.14	1.14	1.14	1.14	1.14	1.14	1.14	1.14	1.14	1.14
3	0.37	0.37	0.37	0.37	0.66	0.72	0.78	0.81	0.90	0.93	1.01	1.04	1.23	1.23	1.23	1.23	1.23	1.23	1.23	1.23	1.23
4	0.39	0.39	0.39	0.39	0.39	0.49	0.71	0.77	0.83	0.88	0.91	0.99	1.20	1.20	1.20	1.20	1.20	1.20	1.20	1.20	1.20
5	0.39	0.39	0.39	0.39	0.39	0.40	0.44	0.72	0.78	0.83	0.89	0.91	0.91	1.15	1.15	1.15	1.15	1.15	1.15	1.15	1.15
17	0.07	0.09	0.11	0.11	0.29	0.33	0.80	0.84	0.91	0.94	0.41	0.44	0.44	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.17
18	0.07	0.09	0.11	0.11	0.29	0.33	0.80	0.83	0.91	0.94	0.41	0.44	0.44	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.17
19	0.07	0.09	0.10	0.10	0.29	0.33	0.80	0.83	0.90	0.94	0.41	0.44	0.44	1.14	1.14	1.14	1.14	1.14	1.14	1.14	1.14
20	0.07	0.09	0.10	0.10	0.29	0.31	0.80	0.83	0.90	0.93	0.41	0.44	0.44	1.14	1.14	1.14	1.14	1.14	1.14	1.14	1.14

ATTENDANT POSITIONS REQUIRED      AVERAGE DELAY II MULTIPLES OF AHT(1.30)      AVERAGE DELAY OF DELAYED CALLS II MULTIPLES OF AHT(1.30)

Figure 3-3. Estimating the Average Delay of Delayed Calls

### Estimating the Number of Attendant Positions Required

Given the appropriate variables, you can estimate the number of attendant positions required to achieve a desired Speed of Answer. You need the following:

- Erlang-C CCS Capacity Tables
- AWT
- AOL
- Desired Speed of Answer

#### Example:

For this example, we will continue with the previous example's data; that is:

- AWT = 27.6 seconds
- AOL = 47.83 CCS
- Assuming that the Desired Speed of Answer = 13 seconds

To determine the Average Delay in Multiples of AWT:

$$\text{Average Delay in Multiples of AWT} =$$

$$\frac{\text{Desired Speed of Answer}}{\text{AWT}} = \frac{13 \text{ seconds}}{27.6 \text{ seconds}} = .4710$$

**Figure 3-4. Estimating the Average Delay of Delayed Calls**

- In the table shown in [Figure 3-9](#), Erlang-C Infinite Queue Capacity, locate the column that most closely corresponds to the objective delay of .4710 (this falls between .450 and .500, so use the .500 column).
- Read down the column until the offered load closest to 47.83 CCS is found (this falls between 41.6 and 74.3, so use the 41.6 row).
- Read horizontally to the left or right margin to find the number of servers required (number of servers required = 2).

GROUP	AVERAGE DELAY - AVERAGE HOLDING TIME																GROUP	
	.001	.005	.010	.20	.100	.130	.150	.200	.250	.300	.350	.400	.450	.500	.700	1.00		2.00
1	0.0	0.2	0.8	.0	3.3	3.9	4.7	6.0	7.2	8.3	9.3	10.3	11.2	12.0	18.0	18.0	28.0	1
2	2.3	3.1	7.2	0.7	21.7	23.4	26.0	29.8	32.2	34.4	36.7	38.3	40.1	41.6	46.2	50.9	58.0	2
3	9.7	14.0	21.1	3.2	84.0	89.4	93.2	98.0	101.9	105.1	107.8	110.1	112.2	114.0	120.7	125.3	138.2	3
4	21	32	48	73	73	74	83	89	93	97	100	103	104	104	111	120	130	4
5	38	52	81	102	108	111	120	124	126	128	131	132	132	132	142	152	163	5
67	1107	1294	1332	332	1380	1338	1369	1389	1402	1413	1424	1428	1432	1436	1438	1440	1473	67
68	1210	1321	1345	367	1373	1369	1403	1428	1438	1449	1457	1463	1469	1473	1468	1467	1710	68
69	1289	1343	1348	402	1410	1407	1441	1468	1478	1488	1493	1499	1503	1507	1502	1501	1784	69
70	1300	1394	1332	437	1484	1480	1474	1494	1510	1520	1528	1533	1538	1541	1536	1535	1791	70

COLUMN CLOSELY CORRESPONDS TO OBJECTIVE DELAY OF .4710      ATTENDANT OFFERED LOAD CLOSEST TO 47.83

**Figure 3-5. Estimating Attendant Position Requirements**

### Estimating Percent Occupancy

To determine the percent occupancy (total time) you will need the following data:

- Number of attendant positions staffed
- AOL

#### Example:

For this example we will continue with the previous example's data; that is:

- AOL = 47.83 CCS
- # of positions staffed = 2

Assume that the attendant positions are staffed 100 percent of the time, then each position can handle 36 CCS of load during the peak hour.

---

$$\% \text{ Occupancy (total time)} = \frac{AOL}{\# \text{ positions} \times 36 \text{ CCS}} \times 100 =$$
$$\frac{47.83 \text{ CCS}}{2 \times 36 \text{ CCS}} \times 100 = 66\%$$

---

**Figure 3-6. Estimating Attendant Position Requirements**

## **Automatic Circuit Assurance**

---

This section describes the parameters and measurements reports for the Automatic Circuit Assurance (ACA) feature. Specifically, these two reports are identified as the (1) ACA Parameters Report, and (2) ACA Measurements Report.

The ACA feature may be used to identify possible malfunctioning trunks by providing an alerting mechanism that monitors:

- The occurrence of an excessive number of short holding time calls
- The occurrence of calls that have an abnormally long holding time

When the number of short holding time calls exceeds the threshold administered for a trunk group, or the duration of a call exceeds the administrated long holding time limit for the trunk group, the following actions occur:

1. An entry is made on the ACA Measurement Report.
2. A referral call is placed to a designated attendant console or display-equipped voice terminal.

### **⇒ NOTE:**

Refer to *DEFINITY Enterprise Communications Server Release 5 Administration and Feature Description*, for a more complete description of the ACA feature.

### **Background Information:**

1. To determine if the ACA feature is enabled, execute the **display system-parameters feature** command.
2. When ACA is enabled, it may be used either on a single system basis or in a Distributed Communications System (DCS) network. Administration of the ACA Referral Calls field (also displayed on the System Parameters screen) determines where referral calls terminate. For DCS networks, one switch (the primary) is administered to receive ACA referred calls from

remote nodes in the network for all switches within the network. Furthermore, the field ACA Remote PBX Identification must be administered with the PBX ID of the node that is designated as primary.

For non-DCS arrangements, the switch is administered as local.

3. The switch that displays the ACA measurements must have a valid number administered in the `ACA Referral Destination` field.
4. A valid ACA referral destination can be any of the following:
  - An individual attendant
  - The attendant group
  - A designated station that is equipped with an alphanumeric display
5. Those systems equipped with a Speech Synthesizer circuit pack may also provide an audio (voice synthesized) report of the referral calls.

## **ACA Parameters Report**

---

The ACA Parameters Report lists all trunk groups in the system and displays the current definitions (parameters) for long and short holding times.



### **NOTE:**

The parameters are administered on the trunk group forms.

## **Command**

---

To display the ACA Parameters Report, enter:

```
list aca-parameters [number][to number][name] [aca-on y or n]  
[count-# on n] [print/schedule]
```

**Options:** The group number, group name, "aca on," count, print, and schedule options are available for this command.

## Screen

[Screen 3-6](#) shows a typical screen for the ACA Parameters Report. [Table 3-4](#) describes the data fields presented in the ACA Parameters Report screen.

```
list aca-parameters
ACA PARAMETERS
Group          Group      Group      ACA      Short      Short      Long
Number  TAC  Type      Name      On?  Hold Time  Thres      Hold Time
41      351  tie      MARKETING      n      10      15      1
42      352  tie      PURCHASING      n      10      15      1
43      353  isdn-pri  D5-G2 PRI Tie      n      10      15      1
44      354  tie      FINANCE      n      10      15      1
45      355  tie      SALES      n      10      15      1
46      356  tie      NEW YORK      n      10      15      1
54      373  wats      SERVICE-WATS      y      10      15      1
55      371  tie      DATA LINK      n      10      15      1
57      387  tie      2 WAY TIE LINE      y      10      15      1
58      386  wats      NJ-WATS      y      10      15      1
59      385  wats      WATS-800      y      10      15      1
60      384  did      DID      y      10      15      1
61      383  co      WASHINGTON      y      10      15      1
Command successfully completed
Command:
```

**Screen 3-6. Typical ACA Parameters Report**

**Table 3-4. ACA Parameters Report**

Field	Description
Group Number	A unique number (assigned during administration) that identifies each trunk group. It may be any number within the range of one to the maximum number of trunk groups supported by the system.
TAC	The Trunk Access Code (assigned during administration) for the trunk group.
Group Type	<p>The type of trunk. The system allows the following trunk types:</p> <ul style="list-style-type: none"> <li>■ Access (<code>access</code>)</li> <li>■ Advanced Private Line Termination (<code>ap1t</code>)</li> <li>■ Central Office (<code>co</code>) or Public Network Service</li> <li>■ Customer Provided Equipment (<code>cpe</code>)</li> <li>■ Digital Multiplexed Interface-Bit Oriented Signaling (<code>dmi-bos</code>)</li> <li>■ Direct Inward Dialing (<code>dia</code>)</li> <li>■ Direct Inward/Outward Dialing (<code>diod</code>)</li> <li>■ Foreign Exchange (<code>fx</code>)</li> <li>■ Integrated Services Digital Network (<code>isdn-pri</code>)</li> <li>■ Release Link Trunk (<code>rlt</code>)</li> <li>■ Tandem (<code>tandem</code>)</li> <li>■ Tie Trunk (<code>tie</code>)</li> <li>■ Wide Area Telecommunications Service (<code>wats</code>)</li> </ul> <p> <b>NOTE:</b>                      Refer to the <i>DEFINITY Enterprise Communications Server Release 5 Administration and Feature Description</i>, for a complete definition of these trunk group types.</p>
Group Name	The trunk group identification that is administered on the Trunk Group form.

*Continued on next page*

**Table 3-4. ACA Parameters Report — Continued**

Field	Description
ACA On?	<p>Indicates whether or not the trunk group is being monitored by ACA.</p> <p><b>Suggested Actions:</b> The decision to monitor a trunk group (field entry <i>y</i>) may depend on a complaint from a user, historical problems, or suspicious data from another report. ACA measurements may be used in conjunction with other measurement reports for confirmation purposes. These other reports include:</p> <ul style="list-style-type: none"> <li>■ The list performance trunk-group</li> <li>■ The list performance summary</li> <li>■ The list measurements outage-trunk</li> <li>■ The list measurements trunk-group summary or hourly</li> </ul>
Short Hold Time	<p>The maximum number of seconds that a call will be considered a short holding time call. A holding time that is longer than this value will be considered as a normal call up until the long holding time is exceeded. The short holding time value is specified on the Trunk Group form when the trunk group is administered. The field range is from zero to 160 seconds with 10 seconds being the default.</p>
Short Thres	<p>Short Threshold. The system maintains a running count of each call that has a duration of less than or equal to the administered short holding time. The count is increased by one for each call that meets the short holding time criteria. When this count reaches the designated threshold, an entry is made in the ACA Measurements Report, and a referral call is placed. The threshold value is specified on the Trunk Group form when the trunk group is administered. The field range is from zero to 30 with 15 being the default.</p>
Long Hold Time	<p>The minimum time of seizure, in hours, that the system will consider a call as having a long holding time. This number is specified on the Trunk Group form when the trunk group is administered. The number has a range of zero to ten hours with one hour as the default. A referral call is placed as soon as a single long holding call is detected.</p>

## ACA Measurements Report

---

The ACA Measurements Report displays the audit trail list of short and long holding time referral calls that have been placed.

### Command

---

To display the ACA Measurements Report, enter:

**list measurements aca [print/schedule]**

Options: The print and schedule options are available for this command.

### Screen

---

[Screen 3-7](#) and [Screen 3-8](#) show a typical screen for the ACA Measurements Report. The date and time that the report was requested is displayed to the right, following the name of the report.

This report may contain up to 64 entries on several pages. If more than 64 referrals have been entered since the last system reinitialization, the report will show the 64 most recent entries; older entries, if any, will have been overwritten. As shown in [Screen 3-7](#), if more than 14 referrals have occurred since the last system re-initialization, press NEXT PAGE to see additional entries, or press CANCEL to exit the report.

#### NOTE:

For wideband calls that consume more than 64 kbps of bandwidth, only the lowest numbered B-channel is shown on the ACA Measurements report. In addition, on the report, entries that pertain to referral calls associated with wideband facilities will be designated by a "w" in the right most position of that report entry.

#### NOTE:

If the ACA measurements report contains entries for referral calls pertaining to wideband facilities the subtitle (w = Wideband Support) will append to the report title.

[Table 3-5](#) describes the data fields presented in the ACA Measurements Report .

```
list measurements aca                                     Page 1
Switch Name: Cust_Switch_Name                          Date: 2:11 pm TUE May 1, 19xx
Automatic Circuit Assurance Measurements (W=Wideband Support)
Day & Time      Trunk      Trunk      Trunk      Type of
of Referral    Group No.  Access Code Member      Referral
29/10:00      57         387        6          Long
28/14:00      62         382        4          Short
27/20:00      59         385        1          Long
27/19:00      59         385        1          Long
24/15:58      59         385        2          Long
24/10:00      63         381        1          Long
24/09:00      63         381        1          Long
23/11:00      61         383        9          Short
23/09:00      61         383        9          Long
22/13:18      63         381        5          Long
22/11:42      62         382        12         Long
22/06:44      57         387        11         Short
21/13:00      62         382        5          Long
20/21:22      61         383        1          Long
press CANCEL to quit -- press NEXT PAGE to continue
```

**Screen 3-7. ACA Measurements Report — Page 1**

```
list measurements aca                                     Page 2
Switch Name: Cust_Switch_Name                          Date: 2:11 pm TUE May 1, 19xx
Automatic Circuit Assurance Measurements (W=Wideband Support)
Day & Time      Trunk      Trunk      Trunk      Type of
of Referral    Group No.  Access Code Member      Referral
20/15:52      63         381        3          Long
20/13:00      60         384        8          Long
17/16:26      63         381        2          Long
17/13:38      63         381        3          Short
16/22:17      60         384        7          Long
16/12:26      57         387        5          Short
16/12:26      43         353        2          Long W
16/11:46      60         384        7          Long
Command successfully completed
Command:
```

**Screen 3-8. ACA Measurements Report — Page 2**

**Table 3-5. ACA Measurements Report**

Field	Description
Day & Time of Referral	<p>The day and time at which either the threshold for short holding time calls was exceeded or long holding time call was reached and a referral call was placed (see <a href="#">Table 3-4</a> for definitions of short and long holding times and the short threshold counter). Expressed as: day of the current month/hour:minute</p> <p>The report lists referral calls beginning with the most recent and continuing back in time until either all referrals are listed or the most recent 64 are listed. A referral call is completed if the call is answered. A call that is not answered will be attempted again at the top of the next hour and each subsequent hour until it is answered or when a new ACA call is received.</p>
Trunk Group No.	Number of the trunk group over which the referral call was placed.
Trunk Access Code	Trunk Access Code for the trunk group.
Trunk Member	The specific trunk in the group that experienced the short or long holding time infraction. This information can be used, with other maintenance tests, to identify the equipment location (circuit pack) of the trunk group member. For wideband trunk groups, the number shown is the lowest numbered trunk used in the wideband call.
Type of Referral	<p>Indicates whether the referral occurred as the result of too many <i>short</i> holding time calls or an excessively <i>long</i> holding time call.</p> <p><b>Suggested Action:</b> Generally, a referral call should serve as a warning of potential trunk failures. In addition, an excessively long-holding call may indicate a security breach. Resolution of the problem should, in most cases, be the function of maintenance personnel. Depending upon local arrangements, it may be appropriate to alert maintenance personnel if they have not already been alerted.</p>
Wideband Flag	If the call was a wideband call, a "W" appears next to the entry. In addition, if any wideband calls appear on the report, the tag "W = Wideband Support" appears in the report heading.

## ARS/AAR/UDP Route Pattern Selection

---

Automatic Route Selection (ARS), Automatic Alternate Routing (AAR), and the Uniform Dial Plan (UDP) are features that route calls over public and private networks. To route the calls, ARS, AAR, and UDP select a routing pattern. A routing pattern is a list of trunk groups and a set of parameters that define the conditions under which each trunk group should be chosen to route calls.

There are two measurement screens related to routing patterns. The [Route Pattern Measurements Selection](#) screen displays the list of patterns that are to be measured. The Route Pattern Measurements Report displays traffic data for the specified pattern (as a whole) as well as the distribution of traffic on the trunk groups in the pattern.

## ARS/AAR/UDP Route Pattern Measurements Selection Form

---

You can select route patterns for measurement.

### Commands

---

To display the list of route patterns that are to be measured, enter:

**display meas-selection route-pattern [print/schedule]**

To change the list of routing patterns that are to be measured, enter:

**change meas-selection route-pattern**

Options: The print and schedule options are available for the "display" command (see Note).

#### NOTE:

Routing pattern numbers are administered as a part of the system implementation process; more specifically, as a part of administering the ARS, AAR, or UDP features. This procedure is fully described in the *Administration and Feature Description* manual.

### Screen

---

[Screen 3-9](#) shows a typical Route Pattern Measurements Selection form containing entries for the 25 patterns to be measured. [Table 3-6](#) describes the data fields presented in the Route Pattern Measurements Selection Form.

```
change meas-selection route-pattern
                                ROUTE PATTERN MEASUREMENT SELECTION
Pattern No.      Pattern No.      Pattern No.      Pattern No.      Pattern No.
1: _____    6: _____    11: _____   16: _____   21: _____
2: _____    7: _____    12: _____   17: _____   22: _____
3: _____    8: _____    13: _____   18: _____   23: _____
4: _____    9: _____    14: _____   19: _____   24: _____
5: _____   10: _____   15: _____   20: _____   25: _____
```

### Screen 3-9. Route Pattern Measurements Selection

If the pattern number(s) you desire are not listed, you can add the desired numbers if there is space available, or you can replace existing pattern numbers that are no longer needed: Press RETURN until the cursor is placed on an undesired pattern number; enter the desired new number, or, press CLEAR FIELD and enter the desired new number. Pattern numbers do not have to be in numerical order. The actual changes are made when you press ENTER. As always, a command can be aborted by pressing CANCEL.

**Table 3-6. Route Pattern Measurements Selection Form**

Field	Description
Pattern No.	<i>Pattern number.</i> Lists the numbers of the 25 patterns selected for measurement.

## ARS/AAR/UDP Route Pattern Measurements Report

The Route Pattern Measurements Report contains usage measurements for each of the 25 selected routing patterns. This report displays traffic data for the specified pattern (all trunk groups within the pattern, as a whole) as well as the distribution of traffic on each trunk group in the pattern.

### Command

To display the Route Pattern Measurements Report, enter:

**list measurements route-pattern pat\_no yesterday/today/last-hour  
 [print/schedule]**

**Options:** The print and schedule options are available for this command.

Type the identifying number of the pattern you wish to display. This number must previously have been assigned to one of the 25 numbers on the meas-selection

route-pattern form. In order to obtain data for the pattern, it must previously have been administered on the ARS/AAR/UDP forms.

You must also enter "today" for today's total activity, "yesterday" for yesterday's total activity, or "last-hour" for the activity of the most recently completed hour.

For example, to display yesterday's measurements for route pattern 27, enter:

**list measurements route-pattern 27 yesterday**

## Screen

[Screen 3-10](#) shows a typical screen for the Route Pattern Measurements Report. [Table 3-7](#) describes the data fields presented in the report.

```
list measurements route-pattern 1 last-hour
Switch Name: Cust_Switch_Name           Date: 1:54 pm MON SEP 16, 19xx
                ROUTE PATTERN MEASUREMENTS (W=Wideband Support)
Pat.  Queue  Calls   Calls   Calls   Calls   Queue
No.   Size   Offered Carried Blocked Queued  Ovflo.
1      5      7       7       0       0       0

                TRUNK GROUP MEASUREMENTS FOR PATTERN
                (trunk groups are shown in order of selection)
Grp  Grp    Grp    Grp    ----- % Calls Carried -----    %    Total
No.  Type   Size   Dir   10 20 30 40 50 60 70 80 90 100  Calls Calls
37  isdn-pri 22    two   ////////////////////////////////////////////////////////////////////    100  7    W
```

## Screen 3-10. Routing Pattern Measurements Report

**Table 3-7. Route Pattern Measurements Report**

Field	Description
Pat. No.	<i>Pattern number.</i> The number of the route pattern being measured.
Queue Size	The size (length) of the queue for the first trunk group in the route pattern. This is commonly referred to as the route pattern queue size. A queue is an ordered sequence of calls waiting to be processed. For this example, a maximum of five calls may be in queue at any one time.
Calls Offered <sup>1</sup>	The total number of calls offered to the route pattern.  $\text{Calls Offered (With Queue)} = \# \text{ of Calls Carried} +$ $\# \text{ of Queue Overflow Calls} +$ $\# \text{ of Queue Abandon Calls}$  $\text{Calls Offered (Without Queue)} = \# \text{ of Calls Carried} +$ $\# \text{ of Calls Blocked}$
Calls Carried	The total number of seizures (for all trunk groups) in the routing pattern.
Calls Blocked	The number of offered outgoing calls that found all trunk groups in the pattern busy. If the queue overflows, then the call is still blocked. Specifically, a blocked call is a call that: <ol style="list-style-type: none"> <li>1. Arrives when there are no available resources</li> <li>2. Arrives and gets queued</li> <li>3. Arrives when the queue is full</li> <li>4. Arrives and cannot queue because the queue length is set to zero</li> <li>5. Cannot queue because the Automatic Callback (ACB) button is busy</li> <li>6. Cannot queue because there is no ACB button</li> </ol>

*Continued on next page*

**Table 3-7. Route Pattern Measurements Report — Continued**

Field	Description
Calls Queued	The number of offered calls that found all trunk groups in the pattern busy and were placed in queue for the first trunk group (first-choice trunk group) in the pattern. These calls also increment the blocked calls counter.
Queue Overflow	<i>Queue Overflow.</i> The number of calls that find the queue on the first trunk group full. Calls attempted while the queue is in overflow receive a reorder signal. These calls also increment the blocked calls counter.
Grp No.	<i>Group Number.</i> The number, assigned via the Trunk Group form, that identifies each trunk group associated with the displayed data. Trunk groups are listed in the same order as they are assigned on the Route Pattern form. The first trunk group listed is the first selected (preference 1); the second listed is the second selected (preference 2), etc.
Grp Type	<p><i>Group Type.</i> The type of trunk in the group. The following types of trunk groups can be accessed through the route pattern:</p> <ul style="list-style-type: none"> <li>■ Access (<i>access</i>)</li> <li>■ Advanced Private Line Termination (<i>ap1t</i>)</li> <li>■ Local Central Office (<i>co</i>)</li> <li>■ Direct Inward/Outward Dialing (<i>diod</i>)</li> <li>■ Foreign Exchange (<i>fx</i>)</li> <li>■ Integrated Services Digital Network-Primary Rate Interface (<i>isdn-pri</i>)</li> <li>■ Tandem (<i>tandem</i>)</li> <li>■ Tie Trunk (<i>tie</i>)</li> <li>■ Wide Area Telecommunications Service (<i>wats</i>)</li> </ul>
Grp Size	<i>Group Size.</i> The number of trunks in the group.
Grp Dir	<i>Group Direction.</i> Identifies whether the assigned trunk groups are outgoing ( <i>out</i> ) or 2-way ( <i>two</i> ). Incoming trunks are not included in route patterns.
% Calls Carried	A graphic display showing the percent of total calls carried over the route pattern by the trunk groups.

*Continued on next page*

**Table 3-7. Route Pattern Measurements Report — Continued**

<b>Field</b>	<b>Description</b>
% Calls	<p>The percent of the total calls carried over the route pattern by the trunk group.</p> <p><b>Suggested Action:</b> The first trunk group listed in the report is the first choice trunk group. This trunk group should always carry a significantly larger percentage of the calls than any of the other trunk groups. If not, you should add more members so that the first choice trunk group has significantly more members than any other group in the pattern.</p>
Total Calls	<p>The total number of calls carried by the route pattern by the trunk group. For the <b>today</b> report, this field indicates the number of calls carried since the previous midnight. For the <b>yesterday</b> report, this field indicates the number of calls carried all day (24 hours) yesterday.</p> <p><b>⇒ NOTE:</b> This column displays a cumulative number; there are no peak data measurements for the route pattern reports. However, you can use the trunk group reports to display "peak" as well as other data for the trunk groups.</p>
Wideband Flag	<p>If a trunk group is administered to support wideband switching, a "W" appears next to the trunk group entry. In addition, if any of the trunk groups on the report support wideband switching, the tag "W = Wideband Support" appears in the report heading.</p>

1. See the ["Trunk Group Measurement Selection Form"](#) for this measurement.

Specifically the number of offered calls includes:

1. The number of calls carried on all trunks in the route pattern.
2. The number of calls that could not queue because there were no available queue slots.
3. The number of calls that queued, but abandoned the queue before seizing a trunk.
4. The number of calls that could not be queued because the queue length was zero.

## Data Analysis Guidelines

---

The following guidelines are intended to show an easy and fast method of determining whether the collected data is invalid or questionable. These guidelines represent the least that you should do for validation. You should perform additional validation as necessary.

To validate the Route Pattern Measurements Report, verify that the following data is in order:

- Total Calls Offered to a pattern should always be equal to the sum of the columns "Calls Carried" plus "Queue Overflow" plus "Queue Abandoned" if there is a queue on the first preference.
- Total percent of all calls carried in a pattern (sum of the % Calls column for each trunk group) should never exceed 100.

## Analyzing the Data

---

The Routing Pattern Data worksheet serves to back up the data from the reports and to provide an easy means to view overall performance of the specified route-pattern. The routing pattern reports/worksheet do not identify a peak hour but do total the data for the identified time period.

The Routing Pattern Measurements Report summarizes data for the specified routing pattern. This report is intended to assist you in determining the following:

- How traffic is distributed over the trunk groups in the pattern
- Whether the Facility Restriction Levels (FRLs) are administered properly
- The proper number of trunk members and trunk groups

Routing Patterns are administered as a part of ARS/AAR/UDP administration. If, after analyzing the data presented with this report, you determine that the Routing Pattern should be changed (for example, you need to increase the number of trunk members or trunk groups), then you must go back to the Routing Pattern form to make the changes. For example, if the FRL for the Routing Pattern is to be changed, you must go back to the ARS/AAR/UDP Routing Pattern form to make this change. A more likely scenario would be that the users, attempting to originate calls over the routing pattern, will be blocked because the number assigned to their FRL is lower than that assigned to the trunk group. A user can only access trunk groups with numbers the same or lower than their FRL number. (They cannot access trunk groups with numbers higher than their FRL's).

A pattern may have enough trunks but may not have proper FRLs assigned to the users that attempt to originate calls with the pattern. If the report indicates a high number for the Calls Queued column and/or Queue Overflow column, but the usage on trunks in the groups following the first choice trunk group is low, consider identifying the group of users who are attempting to originate calls but are being blocked. Then raise this group's FRL. This can be accomplished by

accessing the Class of Restriction form and increasing the FRL number for the identified group or groups of users.

If the report indicates a high Queue Overflow rate and a high usage rate for all trunk groups in the pattern, then this probably indicates that there are not enough trunks. For this scenario a variety of solutions may be implemented. Generally, the simplest is to increase the number of first choice trunks. Another consideration is to add more trunk groups to the pattern. Perhaps the most drastic change is to reorganize the ARS/AAR/UDP Routing Patterns.

Generally, you will want to minimize the number in the Calls Blocked column. In addition, there may be certain users' calls that you do want to block.

Additional and somewhat related information is available on the Performance Summary report. For example, the Performance Summary report lists the five trunk groups that have the highest percent of blocking during their peak hour. Furthermore, the report lists the trunk group members that are out of service. Also listed are the trunk members, by trunk group, that were not used during the reporting period.

The Trunk Groups and Wideband Trunk Groups reports provide measurement data that relates to the Routing Pattern Measurements report. For example, the total number of calls that overflow from the first choice trunk group is listed in the "Grp Ovfl" field. It should be understood that, depending on how the trunk group is administered, these overflow calls are rerouted to the other (second, third, etc.) trunk groups.

## **Call Rate Measurements Report**

This section describes the Call Rate Measurements Report available with DEFINITY systems.

The Call Rate Measurements Report provides traffic data for all calls (incoming, outgoing, and intercom) that are completed on the system during the following time intervals:

- Last hour
- Current day's peak hour
- Previous day's peak hour

The peak hours are the hours with the greatest number of calls and the hours with the busiest 36-second intervals. A 36-second interval (1 one-hundredth of an hour) is used so the number of busy intervals X 100 will give the peak call rate for the listed hour. For example, assume that you have normal traffic and that there were 31 calls for the peak 36-second interval of the last hour, then the peak calling rate would have been 3100 calls for an equivalent hour. The number of calls actually completed is normally much less than this number.

## Command

To display the Call Rate Measurements Report, enter:

**list measurements call-rate [print/schedule]**

**Options:** The print and schedule options are available for this command.

[Screen 3-11](#) shows the Call Rate Measurements Report format. [Table 3-8](#) lists and describes the data in the Call Rate Measurements Report.

```

list measurements call-rate                                     Page 1
Switch Name: Cust_Switch_Name                               Date: 2:24 pm WED SEP 25, 19xx
CALL RATE MEASUREMENTS
Last Hour
-----
Hour   # Compl   Busy Int. (36 sec.) # Busy Int. Calls Compl
1300   18532    13:58:48              193
-----
Today Peak
-----
Hour   # Compl   Busy Int. (36 sec.) # Busy Int. Calls Compl
Busiest Hour: 900     20481    09:51:00              224
Busiest Interval: 900   20481    09:51:00              224
-----
Yesterday Peak
-----
Hour   # Compl   Busy Int. (36 sec.) # Busy Int. Calls Compl
Busiest Hour: 1000    21560    00:00:00              220
Busiest Interval: 1000 21560    00:00:00              220
Command successfully completed
Command:
    
```

### Screen 3-11. Call Rate Measurements Report

The primary purpose of this report is to identify system-level peak calling activity and the hour that the activity occurred. Typically, the busiest hour for peak calling activity (for example, 900 hours in this example) will be the same as the peak hour for all trunk groups, which is identified on the Trunk Group Measurements report. However, conditions could be such that the two reports indicate different hours.

#### NOTE:

The call summary report, which is described next, lists the number of completed calls for the last 24 hours. Therefore, if you compare the Call Rate Report with the Call Summary Report you should see some of the same information. Additional data on various types of calls may be found in the Occupancy Summary Report.

**Table 3-8. Call Rate Measurements Report**

Field	Description
Hour	<p><i>Measurement Hour.</i> The starting time (using 24-hour clock) of the hour during which the data was recorded.</p> <p><b>⇒ NOTE:</b>                      A pair of asterisks in the minute portion of the measurement hour indicates that the switch time was changed during the measurements interval.</p>
# Compl	<p><i>Number of Calls Completed.</i> The total number of calls completed, or answered (including incoming, outgoing, and intercom), during the listed hour.</p>
Busy Int. (36 sec.)	<p><i>Busy Interval (36 seconds).</i> The 36-second interval within the listed hour that had the most calls completed. There are one hundred 36-second intervals in a 1 hour period.</p>
# Busy Int. Calls Compl	<p><i>Number of Busy Interval Calls Completed.</i> The total number of calls completed in the listed busy interval.</p> <p><b>⇒ NOTE:</b>                      All originated calls except those directed to an announcement or those generated by maintenance are counted. For example, a facility access test call will not be counted as a completed call. Wideband calls count as a single call.</p>
Busiest Hour:	<p>For peak listings, this row identifies the busiest hour for today's and yesterday's peak hour. This is the hour that had the largest number of completed calls.</p>
Busiest Interval:	<p>For peak listings, this row identifies the hour that contained the busiest 36-second interval for today and yesterday. The hour containing the busiest 36-second interval is not necessarily the same hour as the one reported as the busiest complete hour of the 24-hour period.</p>

## Call Summary Measurements Report

The Call Summary Measurements Report provides an hourly summary of the traffic data for the last 24 hours. All call completions, except those generated by maintenance, are counted. For example, a Facility Test Call will not be counted as a call completion.

### NOTE:

Calls are counted on initial completion and not as conference and transfer calls.

## Command

To display the Call Summary Measurements Report, enter:

**list measurements call-summary [print/schedule]**

Options: The print and schedule options are available for this report.

## Screen

[Screen 3-12](#) shows the Call Summary Measurements Report format. [Table 3-9](#) lists and describes the data fields in the Call Summary Measurements Report.

```
list measurements call-summary
Switch Name: Cust_Switch_Name                               Date: 4:20 pm TUE MAY 8, 19xx
                                CALL SUMMARY MEASUREMENTS
                                Summary of Last 24 Hours
Hour   # Calls Completed   Hour   # Calls Completed
1500   405                   0300   0
1400   894                   0200   0
13**   201                   0100   0
1200   801                   0000   3
1100   758                   2300   21
1000   621                   2200   12
0900   473                   2100   24
0800   234                   2000   21
0700   103                   1900   34
0600   42                    1800   65
0500   26                    1700   211
0400   2                     1600   543
Command successfully completed
Command:
```

### Screen 3-12. Call Summary Measurements Report

Data is displayed beginning from the most recently completed hour and going backward for 24 consecutive hours. For example, since the report is displayed during the 1600-hour time interval, the last completed hour is 1500. Therefore, the left hour column begins with 1500 and lists (from top to bottom) the 12 preceding hours.

This report indicates that the system clock was reset during the 1300 hour interval. Therefore, the hour is displayed as 13\*\*.

**Table 3-9. Call Summary Measurements Report**

Field	Description
Hour	<p><i>Measurement Hour.</i> The starting time (using 24-hour clock) of the hour during which the data was recorded.</p> <p><b>⇒ NOTE:</b>                      A pair of asterisks in the minute portion of the measurement hour indicates that the switch time was changed during the measurements interval.</p>
# of Calls Completed	<p>The total number of calls completed during the listed hour. Calls are counted in the hour they are answered and not in the hour they are dropped. Therefore, a call that starts in one hour and ends in another hour is counted only in the hour it originates.</p> <p><b>Suggested Action:</b> To determine the types of calls during the measurement hour, use the List Measurements Occupancy Summary Report.</p>

## Call Coverage Measurements

There are two reports that provide measurement information about call coverage.

- The Coverage Path Measurement Report describes coverage activity as it relates to the coverage paths.
- The Principal Coverage Measurement Report describes coverage activity as it relates to principal extensions and PCOL groups.

For each report, there is a selection form that lists the specific coverage paths or principal extensions to be measured.

These reports are used to provide information on what happens to calls that go to coverage. The reports can be used to refine and improve call coverage patterns and to manage the system's principals. The reports are used in conjunction with the **list coverage path** and **display coverage sender-group [number]**.

## Terms

---

Typically, a principal is the party or group for which a call is originally intended. A principal may be a station user, a hunt group, a terminating extension group, or a Personal CO Line (PCOL).

Trunk Access Codes (TACs) are used to access the PCOL groups.

## Feature Interactions

---

### Bridged Call

A call answered by a bridge of a coverage point extension is considered answered by the coverage point. A call answered by the bridge of a principal is considered answered by the principal.

### Call Pick-Up

If the principal is a member of a pickup group, a call ringing at the principal and picked up by a member of the pickup group is considered answered by the principal. If the coverage point extension is a member of a pickup group, a call ringing at the coverage point and picked up by a member of the pickup group is considered answered by the coverage point.

### Leave Word Calling and Automatic Callback

A call for which the calling party activates Leave Word Calling (LWC) or Automatic Callback (ACB) before the call gets redirected and before it gets answered is considered a call back for the principal. If LWC or ACB is activated after the call is redirected, it is considered a call back for the coverage path.

## Trunks

CO trunks and other trunks that have ring-back provided by the CO will repeatedly attempt to complete the call to the principal. Each attempt is considered a new offered call and will be counted for principal or coverage as appropriate.

## Data Analysis Guidelines

---

There is no column for answered calls for principals. Normally, you can assume that:

$$\text{Answered Calls} = \text{Calls Offered} - [\text{Calls Redirected} + \text{Calls Abandoned} + \text{Callback}]$$

However, this is not always the case. A number of interactions affect the totals on the measurement reports so that the column totals will not sum to the total calls offered.

## Call Forwarding

A forwarded call from the principal will be counted as offered or abandoned to the principal. If the call abandons, the call will be counted as abandoned at the principal. If the forwarded-to extension is a measured principal, the call will be counted as an offered call to the forwarded-to extension, but it will not have an "abandon" or a "redirection" associated with it and will appear as answered.

## Bridging and Pickup Groups

The principal, the principal bridge and members of their pickup group(s) all have access to a call *even if* it goes to coverage.

If one of these parties answers the call, the count will show the call was offered to the coverage path without a corresponding count of "answered" or "abandoned." The count will be thrown off and the columns will not add up.

## Distributed Communications System (DCS)

Call Forwarding abandon interactions are different than those described above if forwarding is done off-switch. In that case, each extension is treated as a principal and calls will be counted as abandoned if the caller drops the call.

When a call is forwarded across DCS it will go to coverage based on the forwarded-to principal's path criteria rather than the principal's unless the principal is using cover-all.

Because the one-switch appearance of DCS is achieved using more than one trunk, ACB and LWC calls are counted as abandoned.

## Coverage Path Measurements Selection Form

You can select up to 100 coverage paths for measurement.

### Commands

To display the list of coverage paths that are to be measured, enter:

**display meas-selection coverage [print/schedule]**

To change the list of coverage paths that are to be measured, enter:

**change meas-selection coverage**

To see a list of all the coverage paths on your system, enter:

**list coverage paths [print/schedule]**

**Options:** The print and schedule options are available.

### Screen

[Screen 3-13](#) shows a typical Coverage Path Measurements Selection Form containing entries for the 100 coverage paths to be measured. [Table 3-10](#) describes the data presented in the Coverage Path Measurements Selection Form.

```
change meas-selection coverage
MEASURED COVERAGE PATHS
Path No.   Path No.   Path No.   Path No.   Path No.   Path No.   Path No.
1: 1       17:        33:        49:        65:        81:        97:
2: 6       18:        34:        50:        66:        82:        98:
3: 68      19:        35:        51:        67:        83:        99:
4:         20:        36:        52:        68:        84:        100:
5:         21:        37:        53:        69:        85:
6:         22:        38:        54:        70:        86:
7:         23:        39:        55:        71:        87:
8:         24:        40:        56:        72:        88:
9:         25:        41:        57:        73:        89:
10:        26:        42:        58:        74:        90:
11:        27:        43:        59:        75:        91:
12:        28:        44:        60:        76:        92:
13:        29:        45:        61:        77:        93:
14:        30:        46:        62:        78:        94:
15:        31:        47:        63:        79:        95:
16:        32:        48:        64:        80:        96:
Command successfully completed
Command:
```

### Screen 3-13. Coverage Path Measurements Selection

To add coverage path numbers, use coverage paths with no entry or replace any existing, unneeded coverage paths: Press RETURN until the cursor highlights an unneeded path; enter the coverage path you wish to add, or press CLEAR FIELD and add the new coverage path. Coverage path numbers do not have to be in numerical order. The actual changes are made whenever ENTER is pressed. As always, a command can be aborted by pressing CANCEL.

**Table 3-10. Coverage Path Measurements Selection Form**

Field	Description
Path No.	Displays the numbers of up to 100 coverage paths that are selected for measurement.

## Coverage Path Measurements Report

The Coverage Path Measurements Report contains measurements for each of the 100 selected coverage paths from the Coverage Path Measurement Selection form.

### Command

To display the Coverage Path Measurements Report, enter:

**list measurements coverage-path [starting path] [count (1-100)]  
yesterday-peak/today-peak/last-hour [external] [print/schedule]**

Required Fields and Options: There is one required field for this command: **yesterday-peak/today-peak/last-hour**. You must choose one of these. If you select **yesterday-peak**, the activity for yesterday's peak hour will be listed. The peak hour is the hour with the greatest number of calls offered to the coverage path. If you select **today-peak**, the activity for today's peak hour will be listed. If you select **last hour**, the activity of the most recently completed hour will be listed.

There are four options for this command:

1. **starting coverage path number**

You may type the number of the coverage path you wish to display. This number must have been previously assigned to one of the 100 numbers on the Coverage Path Measurement Selection form. If you do not enter a number, all the measured coverage paths will be displayed.

2. **count**

You must provide a number between 1 and 100.

**3. external**

This option will produce a version of the report showing incoming trunk calls only. Attendant extended calls are considered external.

**4. print or schedule**

This option allows you to print the report immediately or schedule the report to print at another time.

For example, to display yesterday's peak measurements for coverage path 68, enter:

**list measurements coverage-path 68 count 1 yesterday-peak**

**Screen**

[Screen 3-14](#) shows a typical screen for the Coverage Path Measurements Report. The time and date that the report was requested are displayed at the top right. [Table 3-11](#) describes the data presented in the report.

```
list measurements coverage-path 68 count 1 yesterday-peak
Switch Name: Cust_Switch Name                               Date: 3:00 pm  Fri MAY 4, 19xx
                                COVERAGE PATH MEASUREMENTS
Path Meas  Calls  ----- Criteria -----      Point1/4  Point2/5  Point3/6
No.  Hour  Offrd  Act  Bsy  DA  All  SAC  Cback  Ans  Abd  Ans  Abd  Ans  Abd
68   1400   20     2   0   4   0  14    3    5   2   3   3   1   3
                                1    1   0   0   2   4

Command successfully completed
Command:
```

**Screen 3-14. Coverage Path Measurements Report**

**Table 3-11. Coverage Path Measurements Report**

Field	Description
Path No.	The number that identifies the measurement coverage path.
Meas Hour	<p>The starting time (using a 24-hour clock) of the last hour or the hour during which the greatest number of calls were offered to the coverage path.</p> <p><b>⇒ NOTE:</b> A pair of asterisks in the minute portion of the measurement hour indicates that the switch time was changed during the measurements interval.</p>
Calls Offerd	<p>The total number of calls offered to the path.</p> <p><b>Suggested Action:</b> If this number is large, review the principal report and investigate why calls are not being answered. To find the principal for this coverage path, execute the <b>display coverage sender-group [number]</b> command.</p>
Act Criteria	<p>The Active Criteria number of calls offered to this path due to the principal being active.</p> <p><b>Suggested Action:</b> If this number is large compared to <code>calls offerd</code>, you should investigate. A possible reason is that the path was administered for "active" only.</p>
Bsy Criteria	<p>The Bust Criteria number of calls offered to this path due to the principal being busy.</p>
DA Criteria	<p>The Don't Answer Criteria number of calls offered to this path because the principal didn't answer the call after the administered number of rings. To find the administered number of rings, execute the <b>display coverage path [number]</b> command.</p> <p><b>Suggested Action:</b> If this number is large compared to <code>calls offerd</code>, investigate the reason these calls are leaving the principal. A possible reason is, the path was administered for "don't answer" only.</p>
All Criteria	<p>The number of calls offered to this path due to the use of Cover All.</p>

*Continued on next page*

**Table 3-11. Coverage Path Measurements Report — Continued**

Field	Description
SAC Criteria	The Send-All-Calls Criteria number of calls offered to this path due to the principal's use of Send-All-Calls, or the calling party using Go To Coverage.  <b>Suggested Action:</b> If this number, or All Criteria, are unusually large, you should investigate why calls are still being offered to this principal.
Cback	The Call Back number of calls offered to this path where the calling party used LWC or ACB before a coverage point answered the call. These cases are separated out because they are usually considered abandons but counting them as such would be misleading.  <b>Suggested Action:</b> If this number appears high, verify why calls are not being answered.
Point Ans	The Point Answered total number of calls answered by the specified point.
Point Abd	The Point Abandoned total number of calls abandoned by the caller while ringing at the specified point.  <b>Suggested Action:</b> If this number is high, you may want to re-engineer the coverage paths so less traffic is offered to this point.

## Principal Coverage Measurements Selection Form

You can select up to 100 principal extensions or PCOL TACs for measurement.

For definitions of principals and TACs, refer to "Terms" earlier in the ["Call Coverage Measurements"](#) section.

## Commands

To display the list of principal extensions that are to be measured, enter:

**display meas-selection principal [print/schedule]**

To change the list of principal extensions that are to be measured, enter:

**change meas-selection principal**

## Screen

[Screen 3-15](#) shows a typical Principal Coverage Measurements Selection Form containing entries for the 100 principal extensions or TACs to be measured.

[Table 3-12](#) describes the data fields presented in the Principal Coverage Measurements Selection Form.

```
change meas-selection principal
```

MEASURED PRINCIPALS

Ext/TAC	Ext/TAC	Ext/TAC	Ext/TAC	Ext/TAC	Ext/TAC	Ext/TAC
1: 76068	17:	33:	49:	65:	81:	97:
2: 76069	18:	34:	50:	66:	82:	98:
3: 76075	19:	35:	51:	67:	83:	99:
4:	20:	36:	52:	68:	84:	100:
5:	21:	37:	53:	69:	85:	
6:	22:	38:	54:	70:	86:	
7:	23:	39:	55:	71:	87:	
8:	24:	40:	56:	72:	88:	
9:	25:	41:	57:	73:	89:	
10:	26:	42:	58:	74:	90:	
11:	27:	43:	59:	75:	91:	
12:	28:	44:	60:	76:	92:	
13:	29:	45:	61:	77:	93:	
14:	30:	46:	62:	78:	94:	
15:	31:	47:	63:	79:	95:	
16:	32:	48:	64:	80:	96:	

```
Command successfully completed
```

```
Command:
```

### Screen 3-15. Principal Coverage Measurements Selection

To add extension numbers, replace any existing, unneeded extension numbers. To do this, press RETURN until the cursor highlights an unneeded extension number and enter the extension number you wish to add, or press CLEAR FIELD and add the new extension number. Extension numbers do not have to be in numerical order. The actual changes are made when you press ENTER. As always, a command can be aborted by pressing CANCEL.

**Table 3-12. Principal Coverage Measurements Selection Form**

Field	Description
Ext /TAC	Lists the extension or PCOL TAC numbers of up to 100 principals whose coverage is selected for measurement.

## Principal Coverage Measurements Report

The Principal Coverage Measurements Report contains measurements for each of the 100 selected principal extensions or TACs from the Principal Coverage Measurements Selection form.

### Command

To display the Principal Coverage Measurements Report, enter:

**list measurements principal [starting extension/tac] count(1-100) last-hour/today-peak/yesterday-peak [print/schedule]**

Required Fields and Options: There is one required field for this command: **last-hour/today-peak/yesterday-peak**. You must choose one of these. If you select **last-hour** the activity of the most recently completed hour will be listed. If you select **today-peak** the activity for today's peak hour will be listed. If you select **yesterday-peak**, the activity for yesterday's peak hour will be listed. The peak hour is the hour when the greatest number of calls was offered to the principal.

Three options are available for this command:

- 1. starting extension/tac**

You may type the number of the extension or PCOL TAC you wish to display. This number must have been previously assigned to one of the 100 numbers on the Principal Coverage Measurement Selection form. If you don't enter a number, all the measured principals will be displayed.

- 2. count**

You must provide a **number** between 1 and 100 in this position.

3. **print** or **schedule**

This option allows you to print the report immediately or schedule the report to print at another time.

For example, to display yesterday's peak measurements for extension 76068 and the next two principals, in order, enter:

**list measurements principal 76068 count 3 yesterday-peak**

**Screen**

[Screen 3-16](#) shows a typical screen for the Principal Coverage Measurements Report. The time and date that the report was requested are displayed at the top right. [Table 3-13](#) describes the data presented in the report.

```
list measurements principal 76068 count 3 yesterday-peak
Switch Name:  Cust_Switch_Name           Date: 9:14 am  SAT MAY 5, 19xx
                PRINCIPAL MEASUREMENTS
                -----Criteria-----
Ext/TAC  Meas  Calls  Aband  Redir  Act  Bsy  DA  All  SAC  Cback  Coverage-Paths
76068    1000  120    6      15    0   15  0  0   0   0      12
76069    1100   8      0      0    0   0  0  0   8   0      1
76075    1400  40     4      30   15  15  0  0   0   5      1   2      5
Command successfully completed
Command:
```

**Screen 3-16. Principal Coverage Measurements Report**

**Table 3-13. Principal Coverage Measurements Report**

Field	Description
Ext/TAC	The principal extension or PCOL group/TAC being reported.
Meas Hour	<i>Measurement Hour</i> . The starting time (using 24-hour clock) of the hour during which the data was recorded.
Calls Offerd	The total number of calls offered to the principal.
Aband	<p>The total number of abandoned calls, where the calling party hung up before the call was answered or sent to coverage.</p> <p><b>Suggested Action:</b> If this number is high at the principal, you may need to redirect traffic.</p> <p style="text-align: center;"><i>The number of calls answered by principal =</i></p> <p style="text-align: center;"><i>Calls Offered - Calls Abandoned - Calls Redirected</i></p>
Redir	<p>The total number of Redirected calls not answered by the principal and subsequently sent to coverage.</p> <p><b>Suggestion Action:</b> If this number is large compared to <code>Calls offerd</code>, investigate the reasons.</p>
Act Criteria	The number of Active Criteria calls sent to coverage by this principal due to the principal being active.
Bsy Criteria	The number of Busy Criteria calls sent to coverage by this principal due to the principal being busy.
DA Criteria	The number of Don't Answer Criteria calls sent to coverage by this principal because the principal didn't answer the call after the administered number of rings. To find the number of rings, execute the <b>display coverage-path [number]</b> command.
All Criteria	The number of calls sent to coverage by this principal due to the principal's use of Cover All.
SAC Criteria	The number of Send All Calls Criteria sent to coverage by this principal due to the principal's use of Send All Calls, or because the calling party used the Go To Cover feature.

**Continued on next page**

**Table 3-13. Principal Coverage Measurements Report — Continued**

Field	Description
Cback	The number of Call Back calls offered to this principal where the calling party used LWC or ACB before the principal answered the call and before it went to coverage. These cases are separated out because they look like abandons and counting them as such would be misleading.
Coverage-Paths	The coverage paths used by this principal. To find the associated extensions, enter the <b>display coverage sender-group</b> command.   <b>NOTE:</b> This command will display other principals using some coverage paths.

## DS1 Link Performance Measurements

This section describes performance measurements for DS1 links. It includes the DS1 Link Performance Measurements Summary Report and the DS1 Link Performance Measurements Detailed Log Report.

 **NOTE:**

The DS1 links may be provided by the TN722, TN767, or TN464 circuit pack. However, the measurements are only kept for the TN767 and TN464 circuit pack.

Many conventional error measurements have relied on the parameter Bit Error Rate to describe the quality of digital transmission facilities. However, with DS1 links, when errors do occur, they tend to be as error bursts rather than single bit errors. Therefore, the Errored Seconds, Bursty-Errored Seconds, Severely-Errored Seconds, and Failed Seconds measurements more accurately describe the operational characteristics of DS1 links.

DS1 link performance is based on the number of error events counted per second. An error event is defined as any one of the following:

*Misframe.* An error that is detected as an erroneous bit pattern in the bits used to frame on the DS1 signal.

*Slip.* An error that is detected as the deletion or repetition of a single frame. The error is caused by clock differences between systems due to improper synchronization.

*Extended Superframe Format (ESF) CRC-6 Error.* A data communications error over a DS1 link using the ESF format that is detected as a mismatch between the calculated CRC-6 (6-bit cyclic redundancy check) character appended to the transmitted data and the CRC-6 character recalculated by the receiver.

DS1 link performance is measured by the following error event counts:

*Errored Second.* Any second that contains one or more error events.

The percent of Error Free Seconds (%EFS) is defined as:

$$\%EFS = \left[ 1 - \frac{\text{Errored Seconds}}{\text{Total Seconds}} \right] \times 100$$

*Bursty-Errored Second.* Any second that contains from 2 to 319 error events.

*Severely-Errored Second.* Any second that contains 320 or more error events.

*Failed Second.* A state that exists when ten or more consecutive severely-errored seconds are detected. A Failed Second state is cleared when no severely-errored seconds are detected for a period of 10 consecutive seconds.

*Controlled Slip Second.* Any second with one or more controlled slips (a replication or deletion of a DS1 frame by the receiver).

*Loss of Frame Count.* The number of times a loss of frame is declared. A loss of frame is declared when there is a continuous loss of signal or out of frame condition for greater than 2.5 seconds.

### **NOTE:**

Events such as a Failed Second or Severely-Errored Second typically result in a serious impact on the customers' applications.

If the misframe or slip errors become too severe, an alarm is raised. The actual rate at which the errors occur determines whether the alarm is minor or major. *DEFINITY Enterprise Communications Server Release 5 Maintenance for R5r*, and *DEFINITY Enterprise Communications Server Release 5 Maintenance for R5vs/si*, identify the recommended procedures that maintenance personnel should perform to resolve these alarms.

The error event data, collected by the DS1 Interface circuit pack, is available for up to 24 hours in 15-minute increments. Measurement data older than 24 hours is overwritten by the current measurement data.

A system re-boot from tape clears the error event counters. The DS1 error event counters may also be cleared by entering the following maintenance command:

**clear measurements ds1 log NNCSS**

This command uses the following qualifiers:

NN	=	Port network number
C	=	Carrier
SS	=	Slot

If a TN767 or TN464 circuit pack is removed, or taken out of service, data for that circuit pack is not available for the time that the pack is removed. In addition, if a TN767E or TN464F or later suffix circuit pack that is administered for ESF framing is removed or taken out of service, data for the entire 24-hour collection period will be lost since ESF measurements are stored on the board rather than in switch memory.

## **DS1 Link Performance Measurements Summary Report**

---

The DS1 Link Performance Measurements Summary Report provides an indication of the quality of a DS1 link that connects to a DS1 Interface circuit pack.

**⇒ NOTE:**

The error message "Measurements command has timed out. See Traffic Reports manual (555-230-511)." indicates that no response was received from the DS1 circuit pack. Try the command again (maximum of two more times). Note, however, that this error message may be returned from a "list measurements ds1" or "clear measurements ds1" command that uses the "remote" option, for example, "list measurements ds1 summary 1c19 remote", if Interface Unit (IU) equipment in the network is deliberately configured not to respond to ESF performance measurements message inquiries. This is a common network setup and should be considered normal. In this case, the command will never succeed. If, however, this error message is displayed when the network or far-end PBX should be responding to the remote ESF performance measurements inquiries, then the IU itself could have problems or there could be problems on the Facility Data Link span. If the command times out three times, and the configuration is one where a reply to the request should be returned, the problem should be escalated to Tier III.

## Command

---

To display the DS1 Link Performance Measurements Summary Report, enter:

**list measurements ds1 summary NNCSS [local/carrier-local/remote]  
 [print/schedule]**

This command uses the following qualifiers:

NN	=	Port network number
C	=	Carrier
SS	=	Slot
local	=	Causes the report to display user (local) measurements. These are the user copies of the local (near-end) performance measurements and can be cleared by the user. These measurements cannot be cleared by the carrier.
carrier-local	=	Causes the report to display carrier (network) measurements. These are the carrier copies of the local (near-end) performance measurements. They can only be cleared by the carrier.
remote	=	Causes the report to display remote CSU measurements. These measurements are available from the CSU at the far end of the link. They can be cleared from the near end of the link.

Options: The print and schedule options are available for this command.

## Screen

[Screen 3-17](#) shows a typical screen for the DS1 Link Performance Measurements Summary Report. [Table 3-14](#) describes the data fields presented in DS1 Link Performance Measurements Summary Report.

```
list measurements ds1 summary 1c05
Switch Name: Cust_Switch_Name           Date: 17:59 pm WED APR 13, 19xx

                DS-1 LINK PERFORMANCE MEASUREMENTS SUMMARY REPORT

                Counted Since: 4:27 pm WED APR 13, 19xx
Valid 15-Minute Intervals in Last 24 Hours: 6
  Seconds Elapsed In Current Interval: 135   ESF Error Events: 0
Test: far-csu-loopback                     Pattern: 3-in-24   Synchronized: y
  Loopback/Span Test Bit-Error Count: 53     Test Duration: 00:13:26

                Worst 15-Minute Interval  24-Hour  Current
                Category                   Date   Time   Count   Count   Interval Count
  Errored Seconds      4/13  16:42  68     133    24
  Bursty Errored Seconds 4/13  17:57  540    636    0
  Severely Errored Seconds 4/13  17:57  0       0       0
  Unavailable/Failed Seconds 4/13  17:57  3       5       0
  Controlled Slip Seconds 4/13  17:57  100    167    5
  Loss Of Frame Count   4/13  17:57  2       2       0
```

### Screen 3-17. DS1 Link Performance Measurements Summary Report



**NOTE:**

ESF Error Events, Test, Pattern, Synchronized, Loopback/Span Test Bit-Error Count, Test Duration, Controlled Slip Seconds, and Loss Of Frame Count apply only to the TN767E and TN464F or later suffix circuit packs.

**Table 3-14. DS1 Link Performance Measurements Summary Report**

Field	Description
Counted Since:	The date and time that the counters were last cleared and restarted. The counters are set to 0 and start accumulating data when the system is administered or reinitialized. The current system time appears in this field after the system clock is set. Because the Counted Since field is calculated based on the current time, an error message results if the system clock has not been set following a system reinitialization.
Valid 15-Minute Intervals in Last 24 Hours:	The total number of 15-minute intervals (0 to 96) in the past 24-hour period that have valid values. (An invalid interval is any 15-minute interval during which (a) the system clock was changed, (b) a system reinitialization occurred, or (c) the specified TN767 or TN464 circuit pack was pulled from the carrier. Refer to the DS1 log report for details.)
Seconds Elapsed In Current Interval:	The number of seconds (0 to 899) that have been counted in the current 15-minute interval.
ESF Error Events:	The number of ESF errors (CRC-6 errors or out-of-frame errors) that have been counted with a maximum cumulative value of 65535.
Test:	The type of DS1 loopback/span test currently active. None indicates that no test is currently active.
Pattern:	The type of bit pattern being generated during an extended duration DS1 loopback/span test. None indicates that no pattern is being sent.
Synchronized:	Indicates whether the test pattern being generated by the DS1 board is synchronized (being detected properly by the receiving DS1 circuit pack). N/A will be displayed if no pattern is being generated.
Loopback/ SpanTest Bit-Error Count:	The number of bit-errors detected in the received signal when an extended duration loopback test has been performed.
Test Duration	The duration in seconds that the extended loopback test has run. The maximum value is 99:59:59 (99 hours, 59 minutes, and 59 seconds).
Errored Seconds	The number of errored seconds for the specified interval (maximum of 900). An errored second is any second in which one or more data transmission errors occurred. N/A indicates that the count for that interval was not available, typically because the circuit pack was not inserted during the interval.

*Continued on next page*

**Table 3-14. DS1 Link Performance Measurements Summary Report — Continued**

Field	Description
Bursty Errored Seconds	<p>The number of bursty errored seconds for the specified interval (maximum of 900). A bursty errored second is any second in which 2 to 319 data transmission errors occurred. N/A indicates that the count for that interval was not available. An error count of this severity results in a minor alarm.</p> <p><b>Suggested Action:</b> Resolution of the alarm should, in most cases, be the function of maintenance personnel. Depending upon local arrangements, it may be appropriate to alert maintenance personnel if they have not already been alerted.</p>
Severely Errored Seconds	<p>The number of severely errored seconds for the specified interval (maximum of 900). A severely errored second is any second in which 320 or more data transmission errors occurred. N/A indicates that the count for that interval was not available.</p> <p><b>Suggested Action:</b> Resolution of the alarm should, in most cases, be the function of maintenance personnel. Depending upon local arrangements, it may be appropriate to alert maintenance personnel if they have not already been alerted.</p>
Unavailable / Failed Seconds	<p>A count of one-second intervals during which service is unavailable (0 to 900).</p>
Controlled Slip Seconds	<p>The number of seconds (0 to 255 — counts greater than 255 are still displayed as 255) with one or more controlled slips (a replication or deletion of a DS1 frame by the receiver).</p>
Loss of Frame Count	<p>The accumulation of the number of times a loss of frame is declared (0 to 255 — counts greater than 255 are still displayed as 255). A loss of frame is declared when there is a continuous loss of signal or out of frame condition for greater than 2.5 seconds. The condition is cleared after 15 seconds without a loss of signal or out-of-frame condition.</p>
Worst 15-Minute Interval	<p>The date, ending time, and count for the 15-minute period that contained the maximum count in each error category. If there are no errors, the field will display 0 with the most recent interval.</p>

*Continued on next page*

**Table 3-14. DS1 Link Performance Measurements Summary Report — Continued**

Field	Description
24-Hour Count	The total count in each error category for the last 24-hour period (0 to 65535 — counts greater than 65535 are still displayed as 65535). See <a href="#">Screen 3-21</a> to view the last 96 intervals.
Current Interval Count	The count in each error category for the 15-minute interval in progress when the report was requested. If no errors have occurred yet in any of the categories during the current 15-minute interval, the respective field will contain the number 0. If the system is busy performing call processing functions and cannot respond within 8 seconds, then the field will display N/A.

## DS1 Link Performance Detailed Log Report

The DS1 Link Performance Measurements Detailed Log Report lists errored event records for the past 24 hours. The errored event records are listed for each 15-minute interval. This would show the 96 records (the number of 15-minute intervals in 24 hours) from the current 15-minute interval back to 24 hours before the current interval.

### Command

To display the DS1 Link Performance Measurements Detailed Log Report, enter:

**list measurements ds1 log CabCarSS [local/carrier-local/remote]  
 [print/schedule]**

This command has the following qualifiers.

Cab	=	Cabinet number
Car	=	Carrier
SS	=	Slot

*Continued on next page*

local	=	Causes the report to display user (local) measurements. These are the user copies of the local (near-end) performance measurements and can be cleared by the user. These measurements cannot be cleared by the carrier.
carrier-local	=	Causes the report to display carrier (network) measurements. These are the carrier copies of the local (near-end) performance measurements. They can only be cleared by the carrier.
remote	=	Causes the report to display remote CSU measurements. These measurements are available from the CSU at the far end of the link. They can be cleared from the near end of the link.

Options: The print and schedule options are available for this command.

**⇒ NOTE:**

The errored event records for TN767E and TN464F or later suffix circuit packs that are administered for ESF framing are displayed starting from most recent interval. Measurements for previous suffix TN767 and TN464 boards and for later suffix boards that are administered for D4 framing are displayed from oldest to newest interval.

**Screen**

[Screen 3-18](#) and [Screen 3-19](#) show a typical screen for the DS1 Link Performance Measurements Detailed Log Report. [Table 3-15](#) describes the data fields presented in the DS1 Link Performance Measurements Detailed Log Report.

```
list measurements dsl log 1c05                               Page 1  SPE A
Switch Name: cust_switch_name_____                      Date: 10:44 pm  WED AUG 31, 19xx
```

DS-1 LINK PERFORMANCE MEASUREMENTS DETAILED LOG REPORT

Counted Since:10:42 am TUE AUG 30, 19xx

Date	Time	ES	BES	SES	UAS/FS	CSS	LOFC
08/30	10:57	0__	0__	0__	0__	N/A	N/A
08/30	11:12	0__	0__	0__	0__	N/A	N/A
08/30	11:27	0__	0__	0__	0__	N/A	N/A
08/30	11:42	0__	0__	0__	0__	N/A	N/A
08/30	11:57	0__	0__	0__	0__	N/A	N/A
08/30	12:12	0__	0__	0__	0__	N/A	N/A
08/30	12:27	0__	0__	0__	0__	N/A	N/A
08/30	12:42	0__	0__	0__	0__	N/A	N/A
08/30	12:57	0__	0__	0__	0__	N/A	N/A
08/30	13:12	0__	0__	0__	0__	N/A	N/A
08/30	13:27	0__	0__	0__	0__	N/A	N/A

**Screen 3-18. DS1 Link Performance Measurements Detailed Log Report — Page 1**

```
list measurements dsl log 1c05                               Page 2
Switch Name: cust_switch_name_____                      Date: 12:15 pm  WED SEP 14, 19xx
```

DS-1 LINK PERFORMANCE MEASUREMENTS DETAILED LOG REPORT

Counted Since: 10:42am TUE AUG 30, 19xx

Date	Time	ES	BES	SES	UAS/FS	CSS	LOFC
08/30	13:42	0__	0__	0__	0__	N/A	N/A
08/30	13:57	0__	0__	0__	0__	N/A	N/A
08/30	14:12	0__	0__	0__	0__	N/A	N/A
08/30	14:27	0__	0__	0__	0__	N/A	N/A
08/30	14:42	0__	0__	0__	0__	N/A	N/A
08/30	14:57	0__	0__	0__	0__	N/A	N/A
08/30	15:12	0__	0__	0__	0__	N/A	N/A
08/30	15:27	0__	0__	0__	0__	N/A	N/A
08/30	15:42	0__	0__	0__	0__	N/A	N/A
08/30	15:57	0__	0__	0__	0__	N/A	N/A
08/30	16:12	0__	0__	0__	0__	N/A	N/A

**Screen 3-19. DS1 Link Performance Measurements Detailed Log Report — Page 2**

**Table 3-15. DS1 Link Performance Measurements Detailed Log Report**

Field	Description
Date	The date of the 15-minute interval.
Time	The ending time for the 15-minute interval.
ES	<p><i>Errored Second.</i> The number of errored seconds for the specified interval (maximum of 900). An errored second is any second in which one or more data transmission errors occurred. N/A indicates that the count for that interval was not available, typically because the circuit pack was not inserted during the interval.</p>
BES	<p><i>Bursty Errored Seconds.</i> The number of bursty errored seconds for the specified interval (maximum of 900). A bursty errored second is any second in which 2 to 319 data transmission errors occurred. N/A indicates that the count for that interval was not available. An error count of this severity results in a minor alarm.</p> <p><b>Suggested Action:</b> Resolution of the alarm should, in most cases, be the function of maintenance personnel. Depending upon local arrangements, it may be appropriate to alert maintenance personnel if they have not already been alerted.</p>
SES	<p><i>Severely Errored Seconds.</i> The number of severely errored seconds for the specified interval (maximum of 900). A severely errored second is any second in which 320 or more data transmission errors occurred. N/A indicates that the count for that interval was not available. An error count of this severity results in a major alarm.</p> <p><b>Suggested Action:</b> Resolution of the alarm should, in most cases, be the function of maintenance personnel. Depending upon local arrangements it may be appropriate to alert maintenance personnel if they have not already been alerted.</p>
UAS/FS	<p><i>Unavailable/Failed Seconds.</i> The number of seconds that the link was in the failed seconds state for the specified interval (maximum of 900). A failed second state exists any time that 10 or more consecutive severely-errored seconds have occurred. N/A indicates that the count for that interval was not available. An error count of this severity results in a major alarm.</p> <p><b>Suggested Action:</b> Resolution of the alarm should, in most cases, be the function of maintenance personnel. Depending upon local arrangements, it may be appropriate to alert maintenance personnel, if they have not already been alerted.</p>

*Continued on next page*

**Table 3-15. DS1 Link Performance Measurements Detailed Log Report — Continued**

Field	Description
CSS	<i>Controlled Slip Seconds.</i> The number of seconds (maximum of 255) with one or more controlled slips (a replication or deletion of a DS1 frame by the receiver).
LOFC	<i>Loss of Frame Count.</i> The accumulation of the number of times a loss of frame is declared (maximum of 255). A loss of frame is declared when there is a continuous loss of signal or out of frame condition for greater than 2.5 signals. The condition is cleared after 15 seconds without a loss of signal or out-of-frame condition.

## **DS1 Converter Reports**

This section describes performance measurements for the four facilities associated with a DS1 Converter board. It includes the DS1 Converter Link Performance Measurements Summary Report and the DS1 Converter Link Performance Log Report. These reports are available only on the Release 5r server.

The DS1 Converter board is part of the DS1 Converter Complex which consists of two DS1 Converter boards connected by between one and four facilities (DS1 Facility).

Errors on DS1 facilities tend to occur in error bursts rather than single bit errors. Therefore, the Errored Seconds, Bursty Errored Secs, Severely Errored Secs and Failed Seconds measurements more accurately describe the operational characteristics of DS1 facilities.

There are two DS1 Converter Link Performance Measurements reports:

1. The DS1 Converter Link Performance Measurements Summary Report provides information about the worst 15 minutes, the last 24 hours, and the current 15 minutes for each type of measurement.
2. The DS1 Converter Link Performance Measurements Detailed Report displays a detailed log for the last ninety-six 15-minute intervals for each type of data measured.

DS1 facility performance is based on the number of error events counted per second. An error event is defined as any one of the following:

*Misframe.* An error that is detected as an erroneous bit pattern in any single frame.

*Slip.* An error that is detected as the deletion or repetition of a single frame.

*Extended Superframe Format (ESF) CRC-6 Error.* A data communications error over a DS1 facility using the ESF format which is detected as a mismatch between the calculated CRC-6 (6-bit cyclic redundancy check) character appended to the transmitted data and the CRC-6 character recalculated by the receiver.

DS1 link performance is measured by the following error event counts:

*Errored Second.* Any second that contains one or more error events.

The percent of Error Free Seconds (%EFS) is defined as:

---


$$\%EFS = \left[ 1 - \frac{\text{Errored Seconds}}{\text{Total Seconds}} \right] \times 100$$

---

**Figure 3-7. Estimating Attendant Position Requirements**

*Bursty-Errored Second.* Any second that contains from 2 to 319 error events.

*Severely-Errored Second.* Any second that contains 320 or more error events.

*Failed Second.* A state that exists when ten or more consecutive severely-errored seconds are detected. A Failed Second state is cleared when no severely-errored seconds are detected for a period of 10 consecutive seconds.

**⇒ NOTE:**

Such events as a Failed Second or Severely-Errored Second typically result in a serious impact on the customers' applications.

If the errors become too severe, an alarm is raised. The actual rate that the errors occurred at determines whether the alarm is minor or major. *DEFINITY Enterprise Communications Server Release 5 Maintenance for R5r*, and *DEFINITY Enterprise Communications Server Release 5 Maintenance for R5vs/si*, identify the recommended procedures that maintenance personnel should perform to resolve these alarms.

The error event counters, located on each DS1 Converter board for each administered facility, are polled every 900 seconds (15 minutes). The data is available for up to 24 hours, and measurement data older than 24 hours is overwritten by the current measurement data.

A system re-boot from tape clears the error event counters. The DS1 error event counters may also be cleared by entering the following maintenance command:

**clear measurements ds1-facility log | esf-error-events | loopback/spantest CabCarSSF**

If a DS1 Converter circuit pack is removed, or taken out of service, data for that circuit pack is not available for the time periods that it is removed.

## Commands

---

To clear the DS1 Converter measurements, enter:

**clear measurements ds1-facility log | esf-error-events | loopback/spantest CabCarSSF [local/remote] [print/schedule]**

This command uses the following qualifiers:

Cab	=	Cabinet Number
Car	=	Carrier
SS	=	Slot
F	=	Facility

This command is only available on the Release 5r model. In addition, the user can reset all software counters associated with the specified DS1 Converter circuit pack facility. The **Counted Since** time is also reset and the **Number of Valid Intervals** count is set to zero.

To display the DS1 Converter Performance Measurements Summary, enter:

**list measurements ds1-facility summary CabCarSSF [local/carrier-local/remote] [print/schedule]**

Options: The print and schedule options are available for this command.

To display the DS1 Converter Performance Measurements Detailed report, enter:

**list measurements ds1-facility log CabCarSSF [print/schedule]**

This command uses the same qualifiers as the "clear measurements" command above.

Options: The print and schedule options are available for this command.

## Screens

[Screen 3-20](#) shows a typical screen for the DS1-Facility Summary report. [Table 3-16](#) provides details about the fields in the DS1-Facility Summary report.

[Screen 3-21](#) shows a typical DS1-Facility Detailed Log report. [Table 3-17](#), about the DS1-Facility Log report.

```
list measurements dsl-facility summary 1c21a
Switch Name: Cust_Switch_Name                               Date: 2:51 pm WED SEP 25, 19xx

DS-1 FACILITY LINK PERFORMANCE MEASUREMENTS SUMMARY REPORT

                               Counted Since: 9:03 am WED SEP 25, 19xx
Valid 15-minute Intervals in Last 24 Hours: 96
  Seconds Elapsed Into Current Interval: 875   ESF Error Events: N/A
Test: N/A                                     Pattern: N/A       Synchronized: N/A
  Loopback/Span Test Bit-Error Count: N/A     Test Duration: N/A

      Worst 15-Minute Interval   24-Hour   Current
      Category                   Date    Time    Count    Count   Interval Count
      Errored Seconds           9/24   09:03   0         0         0
      Bursty Errored Seconds     9/24   09:03   0         0         0
      Severely Errored Seconds   9/24   09:03   0         0         0
      Unavailable/Failed Seconds 9/24   09:03   0         0         0
      Controlled Slip Seconds    N/A     N/A     N/A       N/A       N/A
      Loss of Frame Count        N/A     N/A     N/A       N/A       N/A
```

### Screen 3-20. DS1-Facility Summary Report

**Table 3-16. DS1 Converter Performance Measurements Summary Report**

Field	Description
Counted Since	The date and time when the associated measurement counters were cleared or the DS1 Converter facility was administered. The counters are set to 0 and start accumulating data when the system is administered or re-initialized. The current system time appears in this field after the system clock is set. Since the Counted Since field is calculated based on the current time, an error message is prompted back to the user if the system clock has not been set following a system re-initialization.
Valid 15-Minute Intervals in Last 24 Hours	<p>The total number of 15-minute intervals (0 to 96) in the past 24-hour period that contain valid data.</p> <p>The <code>Valid Interval</code> field indicates whether or not a valid count is provided by the DS1 interface circuit pack. A value of Y indicates that all counts are valid for the interval. A value of N indicates that the interval is invalid.</p> <p>An invalid interval is any 15-minute time interval during which (a) the system clock was changed, (b) a system re-initialization occurred, or (c) the specified circuit pack was pulled from the carrier.</p>
Seconds Elapsed In Current Interval	The number of seconds (0 to 899) that have been counted in the current 15-minute interval.
ESF Error Events	The number of ESF errors (CRC-6 errors or out-of-frame errors) that have been counted with a maximum cumulative value of 655351.
Test	The type of DS1 loopback/span test currently active. None indicates that no test is currently active.
Pattern	The type of bit pattern being generated during an extended duration DS1 loopback/span test. None indicates that no pattern is being sent.
Synchronized	Indicates whether the test pattern being generated by the DS1 board is synchronized (being detected properly by the receiving DS1 circuit pack). N/A will be displayed if no pattern is being generated.
Loopback/Spa nTest Bit-Error Count	The number of bit-errors detected in the received signal when an extended duration loopback test has been performed.
Test Duration	The duration in seconds that the extended loopback test has run. The maximum value is 99:59:59 (99 hours, 59 minutes, and 59 seconds).

*Continued on next page*

**Table 3-16. DS1 Converter Performance Measurements Summary Report — Continued**

Field	Description
Category	The type of error to which the count applies (errored seconds, bursty errored seconds, severely errored seconds, unavailable/failed seconds, controlled slip seconds, and loss of frame count). For more information about these categories, see <a href="#">Table 3-6 on page 3-33</a> .
Worst 15-Min Interval	The date, ending time, and count for the 15-minute period that contains the maximum value for each error category. If there are no errors, the field will display 0 with the most recent interval, or N/A if no data has been collected.
24-Hour Count	The total count in each error category for the last 24-hour period (0 to 65535 — counts greater than 65535 are still displayed as 65535). See <a href="#">Screen 3-21</a> to view the last 96 intervals.
Current Interval Count	The count so far in each category for the 15-minute interval in progress when the report was requested. If no errors have occurred yet in any of the categories during the current 15-minute interval, the respective field will contain the number 0. If the system is busy performing call processing functions and cannot respond within 8 seconds, then the field will display N/A.

[Screen 3-21](#) shows one page of a typical DS1 Facility Log Report. This report shows errors within fifteen-minute intervals, over the last twenty-four hour period, and usually extends for several pages. The headings and type of information shown here do not change on subsequent pages.

```
list measurements dsl-facility log le21a                               Page 1
Switch Name: Cust_Switch_Name                                       Date: 2:55 pm WED SEP 25, 19xx

DS-1 FACILITY LINK PERFORMANCE MEASUREMENTS DETAILED LOG REPORT

Counted Since: 9:03 am WED SEP 25, 19xx

Date    Time      ES    BES    SES    UAS/FS    CSS    LOFC
9/25    09:18     0     0     0     0         N/A    N/A
9/25    09:33     0     0     0     0         N/A    N/A
9/25    09:48     0     0     0     0         N/A    N/A
9/25    10:03     0     0     0     0         N/A    N/A
9/25    10:18     0     0     0     0         N/A    N/A
9/25    10:33     0     0     0     0         N/A    N/A
9/25    10:48     0     0     0     0         N/A    N/A
9/25    11:03     0     0     0     0         N/A    N/A
9/25    11:18     0     0     0     0         N/A    N/A
9/25    11:33     0     0     0     0         N/A    N/A
press CANCEL to quit -- press NEXT PAGE to continue
```

**Screen 3-21. DS1-Facility Log Report**

**Table 3-17. DS1 Converter Performance Measurements  
 Detailed Log Report**

Field	Description
Date	The time and date of the current report.
Counted Since	The start time and date when the associated measurement counters were cleared or the DS1 Converter facility was administered.
Date and Time	The date and end time of the 15-minute interval.
ES	<p><i>Errored Seconds.</i> The number of the errored seconds for the specified 15-minute interval (maximum of 900). An errored second is any second in which one or more data transmission errors occurred. "N/A" indicates that the count for that interval was not available, typically because the circuit pack was not inserted during that interval.</p>
BES	<p><i>Bursty Errored Seconds.</i> The number of bursty errored seconds for the specified interval (maximum of 900). A bursty errored second is any second in which 2 to 319 data transmission errors occurred. "N/A" indicates that the count for that interval was not available. An error count of this severity results in a minor alarm.</p> <p><b>Suggested Action:</b> Resolution of the alarm should, in most cases, be the function of maintenance personnel. Depending upon local arrangements, it may be appropriate to alert maintenance personnel if they have not already been alerted.</p>
SES	<p><i>Severely Errored Seconds.</i> The number of the severely errored seconds counter for the specified interval (maximum of 900). A severely errored second is any second in which 320 or more data transmission errors occurred. N/A indicates that the count for that interval was not available. An error count of this severity results in a major alarm.</p> <p><b>Suggested Action:</b> Resolution of the alarm should, in most cases, be the function of maintenance personnel. Depending upon local arrangements it may be appropriate to alert maintenance personnel, if they have not already been alerted.</p>

*Continued on next page*

**Table 3-17. DS1 Converter Performance Measurements  
Detailed Log Report — Continued**

Field	Description
UAS/FS	<p>The value of the unavailable or failed seconds counter for the specified interval (maximum of 900). A failed second state exists any time that 10 or more consecutive severely errored seconds have occurred. An error count of this severity results in a major alarm. N/A indicates that the count for that interval was not available.</p> <p><b>Suggested Action:</b> Resolution of the alarm should, in most cases, be the function of maintenance personnel. Depending upon local arrangements, it may be appropriate to alert maintenance personnel, if they have not already been alerted.</p>
CSS	<p><i>Controlled Slip Second.</i> Any second with one or more controlled slips (a replication or deletion of a DS1 frame by the receiver).</p>
LOFC	<p><i>Loss of Frame Count.</i> The number of times a loss of frame is declared. A loss of frame is declared when there is a continuous loss of signal or out of frame condition for greater than 2.5 seconds.</p>

## Hunt Group Reports

This section describes the traffic measurements, performance, and status reports for ACD/UCD/DDC Hunt Groups.

For more detailed ACD measurements, the BCMS or CMS option is recommended. Contact your Lucent Technologies Account Team.

## Hunt Group Measurements Report

The Hunt Group Measurements Report assists you in monitoring and managing the DDC and UCD hunt groups, and ACD splits. These features permit incoming calls to be terminated directly to a prearranged group of answering positions.

This report shows hunt group measurements for yesterday's peak hour, today's peak hour (as of the time of day that this report is run), and the last hour. A peak hour is the hour within a 24-hour period that had the greatest usage for the specified day.

## Command

To display the Hunt Group Measurements Report, enter:

**list measurements hunt-group [options] [print/schedule]**

Options: Options are **yesterday-peak** for yesterday's report, **today-peak** for today's report, or **last-hour** for a report of the activity from the last completed measurement hour.

## Screen

[Screen 3-22](#) shows a typical screen for the Hunt Group Measurements Report, using the last-hour option. The time and date that the report was requested is displayed at the top right.

[Table 3-18](#) describes the data presented in the Hunt Group Measurements Report.

```

Switch Name: Customer-Name                               Date: 4:16 pm  MON JUL 1, 19xx
                                HUNT GROUP MEASUREMENTS
Grp  Grp      Grp  Meas Total  Calls  Que  Calls  Que  Time  Speed
No.  Name      Siz/ Hour Usage  Ans/  Siz  Calls  Ovfl  Avail Answer
                                Typ.  Aban.
1    Dial-up  4    1500 36    0     0  0     0    108  0
     SAT's   ucd
2    manual  1    1500 0     0     5  0     0    36  0
     hunt   ucd
     group
3    CC_Capacity_3  0    1500 0     0    15  0     0    0   0
     3      ead
4    CC_Capacity_4  0    1500 0     0    15  0     0    0   0
     4      ead
5    CC_Capacity_5  0    1500 0     0    15  0     0    0   0
     5      ead
6    CC_Capacity_6  0    1500 0     0    15  0     0    0   0
     6      ead
                                press CANCEL to quit -- press NEXT PAGE to continue
    
```

**Screen 3-22. Hunt Group Measurements Report**

**Table 3-18. Hunt Group Measurements Report**

Field	Description
Grp No.	<i>Group Number.</i> A number that identifies each hunt group.
Grp Name	<i>Group Name.</i> Name assigned, during administration, to the hunt group.
Grp Siz/Typ	<p><i>Group Size.</i> The number of extensions assigned to the hunt group (not necessarily staffed).</p> <p><i>Group Type.</i> Identifies the type of hunt group, which may be one of the following:</p> <ul style="list-style-type: none"> <li>■ DDC - direct department calling</li> <li>■ UCD - uniform call distribution</li> <li>■ EAD - expert agent distribution</li> </ul>
Meas Hour	<i>Measurement Hour.</i>
Total Usage	<p><i>Total Usage.</i> The sum of all times (in CCS) that the members of a hunt group are busy on hunt group calls. Total Usage is the most important parameter for this report. The maximum possible usage is:</p> <p><i>Maximum Possible Usage = 36 CCS × Total # of Members</i></p> <p><b>Suggested Action:</b> If the Total Usage number approaches the total CCS, you may consider adding another extension to the hunt group but only staffing it during the peak hours. If the hunt group has several extensions and the Total Usage is low, this may be acceptable if the personnel perform other duties.</p> <p><b>⇒ NOTE:</b>                      ACD hunt groups that have been administered to support Multiple Call Handling will display a series of 5 asterisk (*****) in the total usage field. This measurement is not collected for ACD hunt groups that support Multiple Call Handling.</p>

*Continued on next page*

**Table 3-18. Hunt Group Measurements Report — Continued**

Field	Description
Calls Ans / Aban .	<p><i>Calls Abandoned.</i> The total number of calls which attempt to reach the hunt group but abandon the attempt before being answered. Calls may abandon either (1) while in the hunt group queue or (2) while ringing a hunt group extension. This total does not include calls answered by Call Pick Up or other hunt groups, or calls abandoned while listening to a forced first announcement.</p> <p><b>⇒ NOTE:</b>                      ACD calls which are redirected to other splits within the system via the intraflow feature are not counted as abandoned calls. ACD calls which are redirected to another switch (interflow feature) are not counted as abandoned calls.</p> <p><b>Suggested Actions:</b> Observe times during which the Calls Abandoned number may be higher than desired. Subsequently, consider adding one or more agents to the hunt group and staffing these additional positions during the problem times. Also, see "Suggested Action" in the "<a href="#">Total Usage</a>" description.</p>
Que Size	<p><i>Queue Size.</i> The length of the queue assigned to the hunt group during administration.</p> <p><b>Recommendations:</b> There are no specific guidelines for setting queue size. However, the following general recommendations apply. The queue size should be larger than the group size; but, typically not more than three times as large as the group size. An indication that the queue size is too large would be the observance of a higher than expected number for the <code>calls aban</code> field. An indication that the queue size is too small would be the fact that a larger than expected number of <code>Queue Ovfls</code> occurred.</p>
Calls Que.	<p><i>Calls Queued.</i> Total number of calls that arrive to find all members of the hunt group busy and are placed in the hunt group queue. Calls Queued includes all calls that go to coverage.</p>

*Continued on next page*

**Table 3-18. Hunt Group Measurements Report — Continued**

Field	Description
Que Ovfl	<i>Queue Overflow.</i> The number of calls that arrive when all slots in the hunt group queue are occupied.
Time Avail	<p><i>Time Available.</i> The total time (in CCS) that the hunt group extensions are not in use but are available to receive hunt group calls during the measurement hour. Time Available is calculated only when an agent (extension) is ready to receive calls from the specified hunt group. For example, if the hunt group had four extensions and each was available for 15 minutes during the measurement hour, the total time available would be 60 minutes or 36 CCS.</p> <p><b>⇒ NOTE:</b>                      ACD hunt groups that have been administered to support Multiple Call Handling will display a series of 5 asterisk (***** ) in the total usage field. This measurement is not collected for ACD hunt groups that support Multiple Call Handling.</p>
Speed Answer (sec)	<i>Speed of Answer.</i> The average time interval (in seconds) from when the call first enters the hunt group or hunt group queue until the call is answered by a hunt group member. This does not include the time taken by a forced first announcement.

## Data Analysis Guidelines

The following guidelines are intended to show an easy method for determining whether currently reported data is acceptable or not. These guidelines represent the minimum that you should do to verify that the recorded measurement values are consistent with expected and historic values. You should perform additional checks as necessary.

To check the acceptability of hourly Hunt Group Measurements Reports, verify the following:

- The system clock or group size has not been changed during the measurement hour.
- The average time agents spend working on calls is typically between 60 and 300 seconds. The actual application and specific types of work being performed may permit you to arrive at a more precise number. If your calculated average call length is out of this range, it should be investigated.

**⇒ NOTE:**

Total Usage plus Total Avail (both in CCS) should not exceed  $36 \times$  the group size. For example, with a hunt group containing two extensions, total usage measured should not exceed  $2 \times 36 = 72$  CCS for data collection.

## Analyzing the Data

---

The Hunt Group Data Worksheet serves to back up the data from the reports and to provide an easy means for identifying the peak hour. The data from the identified peak hour should be used in subsequent calculations.

Before analyzing data obtained from the hunt group reports, several additional considerations relating to both ACD hunt groups and non-ACD hunt groups need mentioning. These include their similarities and differences.

**⇒ NOTE:**

It should be realized that data collected in a real-time environment, such as what actually happens, will virtually always deviate from the theoretically predicted data because of the asynchronous nature of processes and interactions with other events such as maintenance.

## Important Considerations for Both ACD and Non-ACD Hunt Groups

1. *Total Usage:* If the extension is a member of more than one hunt group, then Total Usage will only be accumulated for the group that answers the call. But, Time Avail is decremented for all groups. For example, assume that extension x3000 belongs to hunt groups 1, 2, and 3. Furthermore, assume that a call terminates on hunt group 2 and that x3000 answers the call. The end result is that usage time is accumulated for hunt group 2 (thus increasing Total Usage for group 2 and decrementing Time Avail for groups 1, 2, and 3).

Time (Total Usage) is not accumulated when a hunt group member is on an incoming or outgoing personal call.

2. *Time Avail:* If an extension is a member of more than one hunt group, then Time Avail is accumulated for each group. For example, assume that extension x3000 belongs to hunt groups 1, 2, and 3. Furthermore, assume that extension x3000 is available for the full measurement hour. The end result is that 36 CCS will be added to Time Avail for hunt groups 1, 2, and 3.

Time (Time Available) is not accumulated when a hunt group member is on an incoming or outgoing personal call.

## Differences Between Non-ACD and ACD Hunt Groups

### For Non-ACD Hunt Groups

1. *Calls Ans*: Incoming calls that route to call coverage (or don't answer criteria) accumulate time (Total Usage and Time Avail) as if they were answered within the hunt group. Furthermore, calls to a hunt group that are picked up by a member of a pickup group are counted as answered within the hunt group.
2. *Calls Aband*: Incoming calls that route to call coverage (or don't answer criteria) are counted as abandoned, for the hunt group, if the caller hangs up when the call is at the ringing coverage point.
3. *Speed of Answer*: Speed of Answer includes any and all times spent in covering to other stations, but does not include the time spent for forced first announcements.

### For ACD Hunt Groups

1. *Calls Aband*: If the caller hangs-up when the call is in queue or while ringing at the agent's position, the call is counted as abandoned. If all members of an ACD split are logged out or in Aux-work mode, incoming ACD calls will not queue for the split and, therefore, are never counted as abandoned.
2. *Speed of Answer*: The Speed of Answer count is set to zero every time a call reaches a new coverage point.

#### NOTE:

Because of this difference, the Speed of Answer values for ACD hunt groups tend to be less (smaller) than for non-ACD type hunt groups.

3. *Calls Ans*: Calls that go to call coverage (or don't answer criteria) and are answered at the coverage point are not included in the number displayed for this report. Unlike non-ACD hunt groups, the ACD hunt group member who initially received the call is available to answer other ACD calls while the coverage point is answering the covered call.
4. *Time Avail* — Not accumulated for ACD calls that go to coverage.
5. *Total Usage* — Not accumulated for ACD calls that go to coverage.

## Total Usage

Total Usage is the sum of all times that the members of a hunt group are busy on incoming group calls.

*Total Holding Time (in seconds) =  $\Sigma$  of the individual Holding Time (in sec)*

*Total Usage (in seconds) = Total Holding Time (in seconds)*

**Figure 3-8. Estimating Attendant Position Requirements**

For demonstration purposes, we will consider a hunt group with 3 calls. Assume that the call durations were of 480, 300, and 220 seconds.

$$Total\ Usage\ (in\ seconds) = 480 + 300 + 220\ seconds$$

$$Total\ Usage\ (CCS) = \frac{1000\ seconds}{100\ seconds\ per\ CCS}$$

$$Total\ Usage\ (CCS) = 10\ CCS$$

**Figure 3-9. Estimating Attendant Position Requirements**

**Average Holding Time**

With the number of Calls Answered and the number for Total Usage, the average length of time that the hunt group members spend answering the calls (Average Holding Time) may be calculated. The calculation is as follows.

$$Average\ Holding\ Time = \left[ \frac{Total\ Usage\ CCS}{Calls\ Answered} \right] \times \frac{100\ Seconds}{CCS}$$

**Figure 3-10. Estimating Attendant Position Requirements**

For demonstration purposes, we will consider the following calculations.

---

$$\text{Average Holding Time} = \left[ \frac{10 \text{ CCS}}{3 \text{ calls}} \right] \times \frac{100 \text{ seconds}}{\text{CCS}}$$

*Average Holding Time = 333 seconds (or 5 minutes and 33 seconds per call)*

---

**Figure 3-11. Estimating Attendant Position Requirements**

## **Hunt Group Performance Report**

---

The Hunt Group Performance Report gives the slowest hourly average speed of answer for each hunt group for either the previous day or the current day (yesterday or today) along with the hour the measurement occurred. The report displays the information both graphically and numerically.

### **Command**

---

To display the Hunt Group Performance Report, enter:

**list performance hunt-group [options] [print/schedule]**

Options: Options are **yesterday** for yesterday's report, **today** for today's report, **print**, or **schedule**.

## Screen

[Screen 3-23](#) shows a typical screen for the Hunt Group Performance Report, using the **yesterday** option.

[Table 3-19](#) describes the data fields presented in the Hunt Group Performance Report.

```
list performance hunt-group yesterday
Switch Name: Cust_Switch_Name           Date: 6:13 pm  THU MAR 30, 19xx
      Hunt Group Performance
      SLOWEST HOURLY SPEED OF ANSWER
Grp Grp  Grp  ----- Slowest Speed of Answer (sec) ----  Speed  Meas  Daily
No.  Size Type  1 2 3 4 5 6 7 8 9 10 20 40 60 80 100 200  Ans(sec) Hour  Avg.
1   3   ucd  ///
2   2   ddc  //////////////////////////////////////
3   5   ddc  //////////////////////////////////////
4   9   ucd  //////////////////////////////////////
5   2   ucd  //////////////////////////////////////
6   1   ddc  //////////////////////////////////////
7   6   ucd  ///////////////
8   4   ddc  //////////////////////////////////////
Command successfully completed
Command:
```

### Screen 3-23. Hunt Group Performance Report

**Table 3-19. Hunt Group Performance Report**

Field	Description
Grp No.	<i>Group Number.</i> A number that identifies each hunt group.
Grp Size	<i>Group Size.</i> The number of extensions assigned to the hunt group (not necessarily staffed).
Grp Type	<p><i>Group Type.</i> Identifies the type of hunt group, which may be one of the following:</p> <ul style="list-style-type: none"> <li>■ DDC - direct department calling</li> <li>■ UCD - uniform call distribution</li> <li>■ EAD - expert agent distribution</li> </ul>
Slowest Speed of Answer (sec)	<i>Slowest Speed of Answer</i> in seconds. A bar graph representation of the "slowest hourly average speed of answer" for the report interval (either yesterday or today).
Speed Ans (sec)	<i>Speed of Answer</i> in seconds. The number of seconds corresponding to the "slowest hourly average speed of answer" (longest amount of time to answer) for the report interval. This time includes queue time and ring time, but does not include the time spent on a forced first announcement.
Meas Hour	<p><i>Measurement Hour</i></p> <p><b>Suggested Actions:</b> From analyzing <a href="#">Screen 3-23</a> you can determine that hunt group #5 has the "slowest hourly speed of answer" for all of yesterday. The value was 31 seconds and the time interval was 1500 hours (3:00 p.m. to 4:00 p.m.). If this time interval happens to be the peak usage hour as indicated from the list measurements hunt group yesterday-peak report, then consider adding/staffing more agents during the peak hour.</p>
Daily Avg.	<p><i>Daily Average.</i> The number corresponding to the 24-hour daily "average speed of answer" for each hunt group.</p> $\text{Daily Average} = \frac{\sum \text{ of the Delays For Each Answered Call}}{\text{Total \# of Answered Calls (so far today)}}$

## Hunt Group Status Report

---

The Status Report gives an instantaneous indication of the load that is pending (number of calls waiting to be serviced) for various hunt groups. The report also indicates the length of time that the oldest call in the queue has been waiting for service.



**NOTE:**

The information on this report is updated every 60 seconds.

### Command

---

To display the Hunt Group Status Report, enter:

**monitor traffic hunt-groups [option]**

Options: Type the number of the hunt group that you want to begin the list. This is referred to as the starting group number. The report displays a list of 32 consecutively numbered hunt groups. The default is to begin the report with hunt group 1.

Because the command is constantly updating, you must press cancel key to end the report.

### Screen

---

[Screen 3-24](#) shows a typical screen for the Hunt Group Status Report.

Each screen displays 32 hunt group fields, even though they may not all be administered. If the hunt group is not administered then its corresponding fields are blank. For each administered hunt group, the report displays the time that the first call in the queue has been waiting for service, the `LCIQ` field. The data on the screen is updated every minute.

[Table 3-20](#) describes the data fields presented in the Hunt Group Status Report. The abbreviated labels are also identified in a key at the bottom of the screen.

```
monitor traffic hunt-groups
                                HUNT GROUP STATUS      14:27 TUE APR 3 19xx
#  S  A  Q  W  LCIQ      #  S  A  Q  W  LCIQ
1  3  0  10  0  0      17
2  2  0  20  0  0      18
3  5  2  10  0  0      19
4  1  0  40  0  0      20
5  6  0  10  1  67     21
6  1  0  10  0  0      22
7  6  1  10  1  141    23
8  4  0  0  0  0      24
9                                25
10                               26
11                               27
12                               28
13                               29
14                               30
15                               31
16                               32
( #: Group; S: Grp Size; A: Active Members; Q: Q Length; W: Calls Waiting)
(LCIQ: Longest Call In Queue in seconds )
```

Screen 3-24. Hunt Group Status Report

**Table 3-20. Hunt Group Status Report**

Field	Description
#	<i>Group Number.</i> A number that identifies the hunt groups.
S	<i>Group Size.</i> The number of extensions assigned to the hunt group (not necessarily staffed).
A	<p data-bbox="303 462 1068 525"><i>Active Hunt Group Members.</i> The number of members in a group that are currently active (only) on incoming hunt group calls.</p> <p data-bbox="303 557 1040 652"><b>⇒ NOTE:</b> This measurement does not include individual extension type calls.</p>
Q	<i>Queue Length.</i> The number of calls allowed to wait for an agent.
W	<i>Waiting Calls.</i> The number of calls currently waiting in the hunt group queue to be serviced by an agent.
LCIQ	<p data-bbox="303 799 1030 894"><i>Longest Call In Queue.</i> Indicates the time in seconds that the oldest call in the hunt group queue has been waiting to be serviced.</p> <p data-bbox="303 915 555 942"><b>Suggested Actions:</b></p> <ol data-bbox="320 964 1068 1197" style="list-style-type: none"> <li data-bbox="320 964 1068 1053">1. If the number of calls waiting (W) is too high (for example, the queue is full or approaching its maximum) it may be desirable to increase the number of active members (A).</li> <li data-bbox="320 1076 1068 1197">2. If the LCIQ field indicates that calls are having to wait in queue too long, it may be appropriate to determine if the calls can be processed faster. Alternately, it may be appropriate to increase the number of active members (A).</li> </ol>

## LAR Route Pattern Measurements Report

The LAR (Look Ahead Routing) Route Pattern Measurements Report contains usage measurements for LAR processing. This report displays the number of reroute attempts performed and the number of successful ISDN call attempts.

### Command

To display the LAR Route Pattern Measurements Report, enter:

**list measurements lar-route-pattern pat\_no yesterday/today/last-hour [print/schedule]**

**Options:** The print and schedule options are available for this command.

Type the identifying number of the pattern you wish to display. This number must previously have been assigned to one of the 25 numbers on the meas-selection route-pattern form. In order to obtain data for the pattern, it must previously have been administered on the ARS/AAR/UDP forms.

You must also enter "today" for today's total activity, "yesterday" for yesterday's total activity, or "last-hour" for the activity of the most recently completed hour.

For example, to display last-hour's measurements for route pattern 1, enter:

**list measurements lar-route-pattern 1 last-hour**

### Screen

[Screen 3-25](#) shows a typical screen for the LAR Route Pattern Measurements Report. [Table 3-21](#) describes the data fields presented in the report.

```
list measurements lar-route-pattern 1 last-hour
```

Page 1 of 1

```

LAR MEASUREMENTS FOR PREFERENCES IN PATTERN 1
(trunk groups are shown in order of selection)
Pref Grp LAR LAR Total Suc. Total Suc.
No. No. Type Calls Rehunt Rehunt Next Next
1 10 *rehu 0 0 0 0 0
2 *1 *none 0 0 0 0 0
3 11 next 0 0 0 0 0
4 *2 *none 0 0 0 0 0
    
```

**Table 3-21. LAR Route Pattern Measurements Report**

<b>Field</b>	<b>Description</b>
Pref No.	Route Preference Number. The number of the administered route preference.
Grp No.	Trunk Group Number. The number, assigned via the Trunk Group form, that identifies each trunk group associated with the displayed data. Trunk groups are listed in the same order as they are assigned on the Route Pattern form. The first trunk group listed is the first selected (preference 1); the second listed is the second selected (preference 2), etc. If an entry in the column is prefixed with and *, it indicates that LAR administration for the preference was changed during the measurement period currently displayed. (LAR valid for isdn-pri trunk groups.)
LAR Type	Type of LAR administered on the AAR and ARS Route Pattern form for the trunk group including. Possible values are: <ul style="list-style-type: none"> <li>■ none — no LAR</li> <li>■ rehu — rehunt in the same preference</li> <li>■ next — reroute to next preference</li> </ul>
LAR Calls	The number of calls initiating LAR processing in the displayed trunk group. Only the initial call is counted, not subsequent rerouting attempts.
Total Rehunt	The number of LAR rehunt attempts within the trunk group.
Suc. Rehunt	The number of successful hunts out of Total Rehunt attempts within the trunk group that ended in the LAR call being rerouted successfully.
Total Next	The total number of LAR attempts that were directed to this trunk group from a previous preference in the route pattern.
Suc. Next	The number of successful LAR attempts that were directed to this trunk group from a previous preference in the route pattern.

## **Modem Pool Groups Report**

This section describes the traffic measurements report for Modem Pool Groups.

The Modem Pool Group Measurements Report contains measurements for monitoring the performance of the Modem Pooling feature. The system records

data for the current day's peak hour, the previous day's peak hour, and the last hour. A peak hour is the hour within a 24-hour period that had the greatest usage for the specified day.

## Command

To display the Modem Pool Group Measurements Report, enter:

**list measurements modem-pool [options] [print/schedule]**

**Options:** Options are **yesterday-peak** for yesterday's report, **today-peak** for today's report, **last-hour** for a report of the activity from the last completed measurement hour, **print**, or **schedule**.

## Screen

[Screen 3-26](#) shows a typical screen for the Modem Pool Group Measurements Report. The time and date that the report was requested are displayed at the top right. [Table 3-22](#) describes the data fields presented in the Modem Pool Group Measurements Report.

```
list measurements modem-pool last-hour
Switch Name: Cust_Switch_Name           Date: 1:51 pm MON SEP 16, 19xx
                                MODEM POOL MEASUREMENTS
Meas  Pool  Pool  Pool  Total  Inc  Tan  Calls  Inc  Tan  Calls  Calls  %
Hour  No.   Size Type  Usage Usage Usage Carried Calls Blk  Ovfl  AMB
1200  1     2  integ  0      0    0    0      0    0    0    0    0
```

**Screen 3-26. Modem Pool Group Measurements Report**

**Table 3-22. Modem Pool Group Measurements Report**

Field	Description
Meas Hour	<i>Measurement Hour.</i> The starting time (using 24-hour clock) of the hour during which the data was recorded.
Pool No.	<i>Pool Number.</i> A number that identifies the modem pool group. The number is assigned during administration.
Pool Size	The number of conversion resources administered in the modem pool group (up to 16 for integrated or up to 32 for combined).

*Continued on next page*

**Table 3-22. Modem Pool Group Measurements Report — Continued**

Field	Description
Pool Type	The type of group, either integrated or combined (integ or comb).
Total Usage	The time in CCS that the members of the modem pool group are active on calls during the polling interval.  $\text{Maximum Usage} = \text{Pool Size} \times 36 \text{ CCS}$
Inc Usage	<i>Incoming Usage.</i> The usage in CCS for modem pool calls (originating from incoming or two-way trunks) that terminate on the switch.  $\text{Outgoing Usage} = \text{Total Usage} - \text{Inc Usage}$
Tan Usage	<i>Tandem Usage.</i> The usage in CCS for tandem calls that used a modem pool member.
Calls Carried	The number of calls that were carried, during the polling interval, by the identified modem pool. This includes both incoming and outgoing calls.
Inc Calls	<i>Incoming Calls.</i> The number of calls (originating from incoming or two-way trunks) that terminate on the switch.  $\text{Outgoing Calls} = \text{Calls Carried} - \text{Inc Calls}$
Tan Calls	<i>Tandem Calls.</i> The number of tandem calls that used a modem pool member.

**Continued on next page**

**Table 3-22. Modem Pool Group Measurements Report — Continued**

Field	Description
Calls Blocked	The number of calls that are blocked due to the unavailability of a conversion resource.  <b>Suggested Actions:</b>  1. If this field indicates that a significant number of modem pool calls are being blocked, then, as a first resort, verify that the users have their data modules set for autobaud.  2. An alternate option is to increase the Pool Size.
Calls Overflow	The number of calls directed to a modem pool group that overflow and terminate successfully in another group.
% AMB	<i>Percent All Modems Busy.</i> The percent of the time that all modem pool members were busy processing calls.

## Performance Summary Report

This section describes the traffic measurements Performance Summary Report. The Performance Summary Report summarizes the Peak Hour Trunk Blocking Daily Routing Pattern traffic data, Trunks Out of Service, and Trunks Not Used. The system gives a summary report for the previous day or the current day.

### Command

To display the Performance Summary Report, enter:

**list performance summary [options] [print/schedule]**

**Options:** Options are **yesterday** for yesterday's report or **today** for today's report.

### Screen

[Screen 3-27](#) and [Screen 3-28](#) show typical screens for the Performance Summary Report. On each screen, the time and date that the report was requested are displayed at the top right. The report displays the information both graphically and numerically. [Table 3-23](#) describes the data fields presented in the Performance Summary Report.

```
list performance summary yesterday                                Page 1
Switch Name:  Cust_Switch_Name                                Date: 4:38 pm SAT MAY 19, 19xx
                                SUMMARY PERFORMANCE REPORT

PEAK HOUR TRUNK BLOCKING                                DAILY ROUTE PATTERN CALLS CARRIED
Grp - %Out Blocking or % ATB - Grp                    Grp - % Calls Per Group Type - %
No.  1 2 3 4 5 6 7 8 9 10 20 50 Blk                    Type 1 10 20 30 40 50 60 80 100 Calls
54  ////////////////////////////////////////////////////////////////// 42                    co ////////////////////////////////////////////////////////////////// 62
59  ////////////////////////////////////////////////////////////////// 39                    fx ////////////////////////////////////////////////////////////////// 28
58  ////////////////////////////////////////////////////////////////// 36                    wats //                                                                5
63  ////////////////////////////////////////////////////////////////// 34                    tie //                                                                5
61  ////////////////////////////////////////////////////////////////// 10                   misc //                                                                0
```

Screen 3-27. Performance Summary Report (Page 1)

```
list performance summary yesterday                                Page 2
Switch Name:  Cust_Switch_Name                                Date: 4:38 pm SAT MAY 19, 19xx
                                SUMMARY PERFORMANCE REPORT

                                TRUNKS OUT OF SERVICE                                TRUNKS NOT USED
Grp  Trunks Out Of Service All Day                    Grp  Trunks Not Used All Day
No.  -----
41   9 19
73   7
211  1 2 3 4 5 6 7 8 9 10
more trunks out of service
Command successfully completed
Command:
```

Screen 3-28. Performance Summary Report (Page 2)

**Table 3-23. Performance Summary Report**

Field	Description
PEAK HOUR TRUNK BLOCKING	<p data-bbox="341 288 1089 516">Lists up to a maximum of five trunk groups that have the highest percent of blocking in a measurement hour (for example, Grp No. 54 had 42 percent blocking). For incoming trunk groups, the percent of blocking is referred to as Percent All Trunks Busy (% ATB). For outgoing and two-way trunk groups, the percent blocking is referred to as % Out Blocking.</p> <p data-bbox="341 521 1089 628">% ATB is the percentage of time that all trunks in the trunk group were simultaneously in use during the measurement interval.</p> <p data-bbox="341 634 1089 861">% Out Blocking is the percentage of outgoing calls that arrive when all trunks are busy (ATB). For trunk groups with no queue, the calls not carried are those calls that could not be carried over any trunk member. For trunk groups with queues, the calls not carried are those calls that could not be carried over any trunk member and could not be queued because the queue was full (for example, the Queue Overflow calls).</p> <p data-bbox="341 867 1089 1076"><b>Suggested Action:</b> You should determine the exact reason that a trunk group is blocking calls. Refer to <a href="#">Trunk Group Performance Report</a> (for the indicated trunk group) to determine if blocking is being caused by a high volume of calls. If it is because of calling volume alone, then consider the possibility of adding more members to the trunk group.</p> <p data-bbox="341 1082 1089 1257">The Total Calls field on this report indicates the calling volume. If blocking is not because of calling volume, the reason must be because trunks are in the maintenance busy state. Determine whether maintenance personnel have been or should be alerted.</p>

*Continued on next page*

**Table 3-23. Performance Summary Report — Continued**

Field	Description
DAILY ROUTING PATTERN CALLS CARRIED	<p>The percentage of calls carried, on a per trunk type basis by the 25 routing patterns that are selected and being measured (with the <b>change meas-selection route-pattern</b> command). The report displays the information both graphically and numerically.</p> <p>This measurement is simply a summation of the Total Calls Carried on a per trunk type basis for the trunk groups listed in the measured route-patterns, divided by the system wide Total Calls Carried for all trunk types all day. The trunk group types for which routing pattern performance is reported in the summary report are: co, fx, wats, tie, and misc. The tie trunk group type includes both internal and external tie, both internal and external Advanced Private Line Termination (APLT) access, and tandem trunk group types. The term misc represents all other remaining trunk group types over which ARS/AAR/UDP calls may be routed.</p>
TRUNKS OUT OF SERVICE	<p>Lists trunk groups with out-of-service trunks over the report interval. A list of the first ten trunks that are out of service is also given. The indication <code>more trunks out of service</code> is given if there are more than four trunk groups with out of service trunks or more than 10 members are out of service in any of the groups listed.</p> <p> <b>NOTE:</b>                      This measurement is a summary of the <b>list measurements outage-trunk</b> report.</p>

*Continued on next page*

**Table 3-23. Performance Summary Report — Continued**

Field	Description
TRUNKS NOT USED	<p>Lists trunk groups with trunks that have not been used over the report interval (yesterday or today). A list of the first five trunks, in each of the identified groups, that have not been used is also listed. The indication <code>more trunks not used</code> is given if there are more than four trunk groups with trunks that have not been used or whenever more than five members are not used in any of the groups listed.</p> <p><b>Suggested Action:</b> You should determine the exact reason that the trunks are not being used. Is the reason because (1) there are more trunks than actually needed, or (2) because there is a problem? If the identified trunk group has a large number of members and there are several trunks within that trunk group that receive few or zero calls, then the obvious conclusion is that there are more trunk members than needed for the trunk group. As a contrast, if there is only one trunk member identified for the trunk group and that member has zero calls, then the trunk probably is defective.</p>

## Port Network Reports

This section discusses the port network reports.

### Blockage Study Report

The Blockage Study Reports provide information on usage and blockage for each port network as well as between switch node pairs.

There are two reports: One provides port network (PN) and port network link (PNL) data and the other provides switch node link (SNL) data. The latter report is available only on the Release 5r server.

A port network link is the hardware that provides a bridge between two port networks in a direct-connect configuration or between a port network and a switch node in a center stage configuration. A switch network link is the hardware that provides a bridge between two switch nodes.

The Blockage Study Reports are designed to identify where congestion is occurring within the switching fabric and provide insight on how ports (load) can be adjusted to achieve satisfactory service. Planning for growth additions is also

simplified because the report allows quick identification and quantification of reserve switching capacity.

Both reports are available for the following time intervals:

- Last Hour
- Today's Peak
- Yesterday's Peak

The Port Network Report provides local TDM time slot usage, pegs and blockages, as well as PNL time slot usage, pegs, and blockages. The Switch Node Report provides SN to SN time-slot usage, pegs, blockages and overflow.

Of the 512 TDM time slots in each port network, usage measurements are only provided for 483 time slots employed in call processing, data links and maintenance. Usage is not reported for the remaining 29 time slots, which primarily serve system functions.

The TDM time slots are sampled every one hundred seconds. Usage measurements for these sampled intervals are expressed in hundred call seconds or CCS. For example, any time slot in use when the sample is taken is assumed busy for the entire sampling interval and is counted as one CCS for the interval. Because there are 36 CCS in an hour and 483 reported time slots, the maximum TDM usage per port network is:

$$\text{Maximum TDM usage} = 483 \times 36 \text{ CCS} = 17,388 \text{ CCS}$$

It should be understood that 17,388 CCS represents the maximum calling volume that a single port network can support. Any calls that attempt to exceed this maximum are blocked because there are no time slots available. The blockage field (`TDM_blockage`) will be incremented when that happens.

There are a maximum of 766 port network fiber time slots associated with a port network connected to another port network or between a port network and a switch node in a center stage configuration. Some of those time slots may be allocated for packet bandwidth, in which case the number will be lower. For T1 remoting, there is a maximum of 188 fiber time slots (`PNL_Time_Slots` field).

The PNL time slots are sampled every one hundred seconds. Usage measurements for these sampled intervals are expressed in hundred call seconds or CCS. For example, any time slot in use when the sample is taken is assumed busy for the entire sampling interval and is counted as one CCS for the interval. Because there are 36 CCS in an hour and 766 reported time slots, the maximum PNL usage per port network is:

$$\text{Maximum PNL usage} = 766 \times 36 \text{ CCS} = 27,576 \text{ CCS}$$

It should be understood that 27,576 CCS represents the maximum calling volume supported between port networks or between a port network and a switch node. Any calls that attempt to exceed this maximum are blocked because there are no time slots available. The blockage field (PNL Blockage) will be incremented when that is the case.

## Command

---

To display the Blockage Study Report screen, enter:

**list measurements blockage pn/sn last-hour/today-peak/yesterday-peak  
 [print/schedule]**

## Port Network Screen

---

[Screen 3-29](#) shows a typical Blockage Study Port Network Report screen. [Table 3-24](#) describes the data fields presented in the Blockage Study Port Network Report.

```
list measurements blockage pn last-hour
Switch Name: Cust_Switch_Name                               Date: 1:45 pm MON SEP 16, 19xx
                                BLOCKAGE STUDY REPORT
                                Time Division Multiplexed (TDM)   Port Network (PN) Link
                                Meas
PN  Hour  Usage  Peg   Peak Blockage  Time-slots Usage  Peg   Peak Blockage
1   1200  2650   5435 125   0             758   2125 3696   72   0
3   1200  7887   1581 250   0             762   6265 1272   170  0
4   1200  6199   8197 190   0             760   5862 4667   195  0
```

**Screen 3-29. Blockage Study Port Network Report**

**Table 3-24. Blockage Study Port Network Report**

Field	Description
PN	The port network being measured.
Meas Hour	Measurement Hour.
TDM Usage	<p>The total TDM time-slot usage, in CCS, for the PN being measured, during the measurement hour. This is calculated as follows:</p> <p><i>TDM Usage = Sum of the allocated TDM time slots at the end of each 100 second interval in a measurement hour.</i></p> <p><i>TDM usage max = 483 x 36 CCS = 17,388 CCS</i></p> <p>After each 100-second interval, a snapshot is taken of the number of TDM time-slots used on each port network.</p>
TDM Peg	The total count of circuit switch TDM time-slot seizure attempts for the PN during the measurement hour (requests for maintenance processes not included).
TDM Peak	The maximum number of time-slots allocated at any one time during the measurement hour.
TDM Blockage	<p>The total count of TDM blockages, that is, the total number of times a TDM time-slot request is denied for the PN being measured, during the measurement hour.</p> <p><b>Suggested Action:</b> Generally, it is desirable to balance the traffic across port networks. If the usage nears the maximum CCS, some resources should be moved to another port network.</p>
PNL Time-Slots	The number of port network link time-slots available between port networks or between port networks and switch nodes. At any given time interval, this translation value is fixed. (Remember, this refers to available time slots, not measurement data.)
Port Network Link Usage	The total circuit switch usage of the available PN Link(s) connecting the PN to the SN or to other PNs. For directly connected PNs in three PN systems, this is the <b>sum of the usage</b> for both links. <i>PN LINK USAGE = Sum of the allocated PN Link time-slots at the end of each 100 second interval in a measurement hour. PN Link Usage Max = 766 x 36 CCS = 27,576 CCS.</i>

*Continued on next page*

**Table 3-24. Blockage Study Port Network Report — Continued**

Field	Description
Port Network Link Peg	The total count of circuit switched time-slot seizure attempts for the link(s) during the measurement hour.
Port Network Link Peak	The maximum number of time slots allocated at any one time on the port network links.
Port Network Link Blockage	<p>The total count of circuit switched PN blockages, that is, the total number of times a PN link time-slot is denied during the measurement hour. This count will include calls originating or terminating on this PN. This field should be zero for all configurations that don't use T1 remoting and are smaller than 16 PNs since the center stage is non-blocking in these configurations.</p> <p><b>Suggested Action:</b> Generally, it is desirable to balance traffic between port networks, or between port networks and switch nodes. If the usage is high for a port network, resources may need to be moved from one port network to another.</p>

## Switch Node Screen

Screen 3-30 shows a typical Blockage Study Switch Node Report screen. Table 3-25 describes those data fields presented in the Blockage Study Switch Node Report that are different from those in the Port Network Report. Refer to Table 3-24 for data fields that are the same. This report is only accessible from the Release 5r server.

```
list measurements blockage sn last-hour
Switch Name: Cust_Switch_Name
Date: 05:45 pm THU FEB 23, 19xx
BLOCKAGE STUDY REPORT
CENTER STAGE
Meas      Switch Node (SN) Link
SN Pair   Hour      Time-slots  Usage    Peg      Blockage  Overflow
1/2      1600      766        9800    49267   0         0
```

**Screen 3-30. Blockage Study Switch Node Report**

**Table 3-25. Blockage Study Switch Node Report**

Field	Description
SN Pair	Identifiers for the two SNs connected by the SNL being measured.
Meas Hour	Measurement Hour.
Switch Node Link (SN) Time-Slots	The number of switch node link time-slots available between switch nodes. At any given time interval, this translation value is fixed. The SNL time slot maximum is 766; for T1 remoting, it is 94.
Switch Node Link Usage	The total circuit switch usage of the SNL connecting the two SNs. This is the total usage on <b>interconnecting fibers</b> . At the end of each 100-second interval, a snapshot is taken of the number of SNL time-slots used on each port network. <i>Max SNL usage = 766 x 36 CCS = 27,576.</i>
Switch Node Link Peg	The total count of circuit switched SNL time-slot seizure attempts during the measurement hour between the two measured SNs. This is the total peg count on <b>all interconnecting fibers</b> .
Switch Node Link Blockage	The total count of circuit switched SNL blockages, that is, the total number of times a call is blocked because no time-slots are available either in the most direct route or through any alternate route, during the measurement hour.

*Continued on next page*

**Table 3-25. Blockage Study Switch Node Report — Continued**

Field	Description
Switch Node Link Overflow	<p>The total number of times a call had to be routed over an alternate route. This counter is incremented when a call could not be successfully routed over the most direct route and had to be routed over an alternate route. This allows you to distinguish true blockage of a call from the direct route blockage.</p> <p><b>Suggested Action:</b> Generally, the usage between switch nodes should be equally distributed. If the usage between switch nodes is high, you may want to move resources to another switch node or add a new switch node.</p>
Switch Node Link Overflow	<p>The total number of times a call had to be routed over an alternate route. This counter is incremented when a call could not be successfully routed over the most direct route and had to be routed over an alternate route. This allows you to distinguish true blockage of a call from the direct route blockage.</p> <p><b>Suggested Action:</b> Generally, the usage between switch nodes should be equally distributed. If the usage between switch nodes is high, you may want to move resources to another switch node or add a new switch node.</p>

## Port Network Load Balance Report

The PNL Load Balance Reports are designed to show the loading on each PN and give an indication of the load source by call type. Knowing the load source means informed decisions can be made on how best to decrease the load or the effect of adding various kinds of ports to the PN. Growth can be accommodated with a minimum of new equipment.

There are five PN Load Balance Reports.

The Total report provides an overview of time slot usage, blockage, pegs, and occupancy for time slots on the TDM bus and port network links. This report also contains an EI board control utilization field (Release 5r only).

The other four reports include time slot usage and pegs for the following call types:

- Intercom
- Incoming Trunk
- Outgoing Trunk
- Tandem Trunk

These reports show characteristic patterns of the load on each port network for each of the call types.

All the reports are peak reports; so, data is provided for last-hour, today-peak and yesterday peak. The peak for each of the four call-type reports is time coincident with the peak from the Total Report (TDM usage field).

## Command

To display the Port Network Load Balance Report screen, enter:

**list measurements load-balance total/intercom/incoming/outgoing/tandem last-hour/today-peak/yesterday-peak [print/schedule]**

Options: The print and schedule options are available for this command.

## Screen

[Screen 3-31](#) depicts an example of a typical screen for the Port Network Load Balance Total Report screen. [Table 3-26](#) describes the data fields presented in the Port Network Load Balance Total Peak Report.

```
list measurements load-balance total today-peak                               Page 1
Switch Name: Cust_Switch_Name                                         Date: 05:45 pm THU FEB 23, 19xx
                                PORT NETWORK LOAD BALANCE STUDY REPORT

TOTAL CALLS
  Meas  Time Division Multiplexed (TDM)  Port Network (PN) Link  Control
PN  Hour  Usage Peg  Peak  Blockage Occ  Usage Peg  Peak Blockage  Occ  Util
1   1500  625  1522  59  0      6    1103  100  35  0      4    15
2   1500  625  1522  48  0      6    1103  100  35  0      4    15
.
.
.
```

**Screen 3-31. Port Network Load Balance Study Report**

**Table 3-26. Port Network Load Balance Total Today Report**

Field	Description
PN	Identifies the port network being measured.
Meas Hour	Measurement Hour.
TDM Usage	The total TDM time-slot usage, in CCS, for the PN being measured:  <i>TDM Usage = Sum of the allocated TDM Time Slots at the end of each 100 second interval in a measurement hour</i>  <i>TDM Total Potential Usage = 483 x 36 CCS = 17,388 CSS</i>
TDM Peg	The total count of circuit switch TDM time-slot seizure attempts for the PN during the measurement hour (requests for maintenance processes are not included).
TDM Peak	The maximum number of TDM time-slots allocated at any one time during the measurement hour.
TDM Blockage	The total count of TDM blockages, that is, the total number of times a TDM time-slot request is denied for the PN being measured, during the measurement hour.
TDM Occ	The percent TDM Occupancy is computed as follows:  <i>(TDM Usage/TDM Total Potential Usage) x 100</i>  <b>Suggested Action:</b> Generally, the load should be distributed evenly across port networks. If the percent occupancy is out of line with the occupancy on other port networks, consideration should be given to shifting resources. Use the Intercom, Outgoing, Incoming and Tandem reports to help determine which resources to shift.
Port Network (PN) Link Usage	The total circuit switch usage of the PN Link(s).(Measured in CCS)  <i>PN Link Usage = Sum of the allocated PN link time-slots at the end of each 100 second interval in a measurement hour.</i>  <i>PNL Total Potential Usage = 766 x 36 CCS = 27,576 CCS</i>
PNL Peg	The total number of circuit switched time slot seizure attempts for the PN during the measurement hour.
PNL Peak	The maximum number of PNL time slots allocated at any one time during the measurement.

**Continued on next page**

**Table 3-26. Port Network Load Balance Total Today Report — Continued**

Field	Description
PNL Blockage	<p>The total count of circuit switched PN link blockages, that is, the total number of times a PN link time-slot is denied during the measurement hour. This count will include calls originating or terminating on this PN. This field should be zero for all configurations that don't use T1 remoting and are smaller than 16 PNs since the center stage is non-blocking in these configurations.</p> <p><b>Suggested Action:</b> If blockages occur in the switching fabric, consider shifting resources. Use the Intercom, Outgoing, Incoming and Tandem reports to determine which resources to switch.</p>
PNL Occ	<p>The percent Port Network Link Occupancy is computed as follows:</p> $(PN\ Link\ Usage / PNL\ Total\ Potential\ Usage) \times 100$
Control Util (Release 5r only)	<p>The fraction of the total capacity of the processor on the measured EI board. This value is expressed in percent, where 0% is the processor occupancy corresponding to no control measure traffic, and 100% is the processor occupancy corresponding to the maximum message traffic that can be handled and meet delay criteria. The data used to calculate this field is obtained as a traffic counter from the EI board. When the processor is idle, it will usually read about 14%.</p>

## Port Network Load Balance Intercom Calls Report

---

### Screen

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[Screen 3-32](#) depicts an example of a typical screen for the Port Network Load Balance Intercom Calls Report screen. [Table 3-27](#) describes the data fields presented in the Port Network Load Balance Intercom Calls Report screen.

```
list measurements load-balance intercom last-hour
Switch Name: Cust_Switch_Name          Date: 1:52 pm MON SEP 16, 19xx
                                PORT NETWORK LOAD BALANCE STUDY REPORT

INTERCOM CALLS
  Meas      Intra PN          Inter PN
PN  Hour    Usage    Peg    Usage    Peg
1   1200    441     490    1329    1964
3   1200    2401     75     6221    1020
4   1200    1031     520    5754    2972
```

**Screen 3-32. Port Network Load Balance Intercom Calls Report**

**Table 3-27. Port Network Load Balance Intercom Report**

Field	Description
PN	Identifies the port network being measured.
Meas Hour	<i>Measurement Hour</i>
Intra PN Usage	TDM time-slot usage caused by station-to-station calls between terminals on the same port network. Usage is displayed in CCS.
Intra PN Peg	The count of TDM time-slot seizures caused by station-to-station calls between terminals on the same port network.
Inter PN Usage	TDM time slot usage caused by station-to-station calls between terminals on different port networks. Usage is displayed in CCS.
Inter PN Peg	<p>TDM time slot seizures caused by station-to-station calls between terminals on different port networks.</p> <p><b>Suggested Action:</b> Generally, load across port networks should be evenly distributed. If inter PN usage is high on a particular network, you should consider shifting station resources to another port network. Although usage data is not displayed for each port network pair, analyzing the distribution of data across each port network can provide insight.</p>

## Port Network Load Balance Incoming Calls Report

---

### Screen

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[Screen 3-33](#) depicts an example of a typical screen for the Port Network Load Balance Incoming Calls Report. [Table 3-28](#) describes the data fields presented in the Port Network Load Balance Incoming Calls Report screen.

```
list measurements load-balance incoming last-hour
Switch Name: Cust_Switch_Name           Date: 1:52 pm MON SEP 16, 19xx
                                PORT NETWORK LOAD BALANCE STUDY REPORT

INCOMING TRUNK
  Meas      Intra PN                Incoming                Outgoing
PN  Hour    Usage  Peg          Usage  Peg          Usage Peg
1   1200    0      0           1784   506          0     0
3   1200    0      0           6111   80           0     0
4   1200    6932   916         0      0           532   586
```

**Screen 3-33. Port Network Load Balance Incoming Calls Report Screen**

**Table 3-28. Port Network Load Balance Incoming Calls Report**

<b>Field</b>	<b>Description</b>
PN	Identifies the port network being measured.
Meas Hour	<i>Measurement Hour</i>
Intra PN Usage	TDM time-slot usage caused by incoming trunk calls to a station on the same port network. Usage is displayed in CCS.
Intra PN Peg	The count of TDM time-slot seizures caused by incoming trunk calls to a station on the same port network.
Incoming Usage	TDM time-slot usage caused by calls to a station on the port network from an incoming trunk on another port network. Usage is displayed in CCS.
Incoming Peg	The count of TDM time-slot seizures caused by calls to a station on the port network from an incoming trunk on another port network.
Outgoing Usage	TDM time-slot usage caused by calls to a station on another port network from an incoming trunk on the measured port network. Usage is displayed in CCS.
Outgoing Peg	The count of TDM time-slot seizures caused by calls to a station on another port network from an incoming trunk on the measured port network.

## Port Network Load Balance Outgoing Calls Report

---

### Screen

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[Screen 3-34](#) depicts an example of a typical screen for the Port Network Load Balance Outgoing Calls Report screen. [Table 3-29](#) describes the data fields presented in the Port Network Load Balance Outgoing Calls Report screen.

```
list measurements load-balance outgoing last-hour
Switch Name: Cust_Switch_Name          Date: 1:53 pm MON SEP 16, 19xx
                                PORT NETWORK LOAD BALANCE STUDY REPORT

OUTGOING TRUNK
Meas      Intra PN                Incoming                Outgoing
PN        Hour   Usage   Peg        Usage   Peg        Usage Peg
1         1200   318    506        1260   1160       0     0
2         1200    0      0          0      0         950   186
3         1200   52     38         72     28        404   1002
```

**Screen 3-34. Port Network Load Balance Study Report**

**Table 3-29. Port Network Load Balance Outgoing Calls Report**

<b>Field</b>	<b>Description</b>
PN	Identifies the port network being measured.
Meas Hour	<i>Measurement Hour</i>
Intra PN Usage	TDM time-slot usage caused by outgoing calls made by stations on the measured port network and serviced by outgoing trunks on the same port network. Usage is displayed in CCS.
Intra PN Peg	The count of TDM time-slot seizures caused by outgoing calls made by stations on the measured port network and serviced by outgoing trunks on the same port network.
Incoming Usage	The TDM time-slot usage resulting from outgoing calls originated at stations on another port network but serviced by trunks on the port network being measured. Usage is displayed in CCS.
Incoming Peg	The count of TDM time-slot seizures resulting from outgoing calls originated at stations on another port network but serviced by trunks on the port network being measured.
Outgoing Usage	The TDM time-slot usage resulting from outgoing calls originated at stations on the port network being measured but serviced by trunks on another port network. Usage is displayed in CCS.
Outgoing Peg	The count of TDM time-slot seizures resulting from outgoing calls originated at stations on the port network being measured but serviced by trunks on another port network.

## Port Network Load Balance Tandem Calls Report

---

### Screen

---

[Screen 3-35](#) depicts an example of a typical screen for the Port Network Load Balance Tandem Calls Report. [Table 3-30](#) describes the data fields presented in the Port Network Load Balance Tandem Calls Report screen.

```
list measurements load-balance tandem last-hour
Switch Name: Cust_Switch_Name           Date: 1:53 pm MON SEP 16, 19xx
                                PORT NETWORK LOAD BALANCE STUDY REPORT

TANDEM TRUNK
  Meas      Intra PN          Incoming          Outgoing
PN  Hour    Usage    Peg      Usage    Peg      Usage    Peg
1   1200    0         0        0         0        0         0
3   1200    0         0        0         0        0         0
4   1200    0         0        0         0        0         0
```

**Screen 3-35. Port Network Load Balance Tandem Calls Report**

**Table 3-30. Port Network Load Balance Tandem Calls Report**

<b>Field</b>	<b>Description</b>
PN	Identifies the port network being measured.
Meas Hour	<i>Measurement Hour</i>
Intra PN Usage	TDM usage caused by tandem trunk calls originating and terminating on the port network being measured. The usage is represented in CCS.
Intra PN peg	Count of TDM time-slot seizures caused by tandem trunk calls originating and terminating on the port network being measured.
Incoming Usage	The TDM usage resulting from tandem trunk calls originating on another port network but terminating on the port network being measured. The usage is represented in CCS.
Incoming Peg	Count of TDM time-slot seizures resulting from tandem trunk calls originating on another port network but terminating on the port network being measured.
Outgoing Usage	TDM usage resulting from tandem trunk calls originating on the port network being measured but terminating on another port network. The usage is represented in CCS.
Outgoing Peg	The count of TDM time-slot seizures resulting from tandem trunk calls originating on the port network being measured but terminating on another port network.

## **System Status Reports**

This section describes the Monitor System Status Reports which provide an overall view of how the system is performing in real-time.

The Monitor System Status commands generate dynamic one-page status reports that summarize the overall current condition of the system and last hour traffic status.

Using the Monitor System Status commands, you can generate two different status report forms. These two forms contain the following information:

**Monitor System View1.** Includes the attendant status, maintenance status, and last hour's traffic data for attendant, hunt, and trunk groups. The form also shows the date and time of day at which the report was requested.

**Monitor System View2.** Includes attendant status, maintenance status, and last hour's traffic data for attendant and trunk groups. The form also shows the date and time of the day at which the report was requested.

Data for attendant and maintenance status are updated every minute. Data for the traffic status is updated once every hour because traffic status is obtained from existing measurements that are collected on an hourly basis.

 **NOTE:**

Requesting either of the system status reports should be your last request during your current log on. The screens are exited by pressing CANCEL, which also logs you off the system, or after a 30-minute time-out.

## Commands

---

Enter one of the following commands to display the desired Monitor System Status Report:

**monitor system view1**

or

**monitor system view2**

## Options

---

There are no options for these commands.

## Screen

[Screen 3-36](#) shows the Monitor System View1 report and [Screen 3-37](#) shows the Monitor System View2 report. [Table 3-31](#) describes the data fields presented in both reports.

```
monitor system view1

          ATTENDANT STATUS                      MAINTENANCE STATUS

          Console no.                          # of alarms for trunks: 0
Activated: 3                                  # of alarms for stations: 0
Deactivated: 1 2                             # of alarms for other res: 0
                                          First OSS number has been informed ? n

          TRAFFIC STATUS
          Measurement Hour: 18

          Trunk Group Measurement              Hunt groups Measurement
(4 grps with highest %time ATB)             (4 grps with highest # of queued calls)
          Grp no:  41  12  23  221              Grp no:  6
          Grp dir:  inc out two two              Calls qued: 2
Calls qued:  17   9  19  12                  Calls aban: 2
          %Out blkg: *   9  18  11              Attendant Group Measurement
          %Time ATB:  86  79  91  93            Calls qued: 9    Calls aban: 1

                                          19:27 FRI MAY 18 19xx

          - press CANCEL to quit -
```

### Screen 3-36. Monitor System View1 Report

```
monitor system view2

          ATTENDANT STATUS                      MAINTENANCE STATUS

          Console no.                          # of alarms for trunks: 0
Activated: 3                                  # of alarms for stations: 0
Deactivated: 1 2                             # of alarms for other res: 0
                                          First OSS number has been informed ? n

          TRAFFIC STATUS  Measurement Hour: 18

          Trunk Group Measurement
(4 grps with highest %time ATB)
          Grp no:  41  12  23  221
          Grp dir:  inc out two two
Calls qued:  17   9  19  12
          %Out blkg: *   9  18  11
          %Time ATB:  86  79  91  93
          Attendant Group Measurement
Calls qued:  9    Calls aban: 1

                                          19:28 FRI MAY 18 19xx

          - press CANCEL to quit -
```

### Screen 3-37. Monitor System View2 Report

**Table 3-31. Monitor System View1 and View2 Reports**

Field	Description
ATTENDANT STATUS	<p>Shows the activated attendant consoles and deactivated attendant consoles. In the sample screens, console #1 and console #2 are deactivated and console #3 is activated.</p> <p> <b>NOTE:</b>                      Activated means that the agent's headset/handset is plugged in the console, and the console is not busied-out or set for Night Service. You can use the <b>status attendant</b> command to obtain other details.</p>
MAINTENANCE STATUS	<p>Shows the number of alarms (including minor and major alarms) that may indicate problems on trunks, stations, and other resources. If any alarm exists in the system or if remote maintenance has acknowledged an alarm, indications are shown on the report. A <b>Y</b> indicates that the alarm has been acknowledged. An <b>N</b> indicates no acknowledgment. You can use the <b>display alarms</b> command to determine exactly what alarms currently exist.</p>

*Continued on next page*

**Table 3-31. Monitor System View1 and View2 Reports — Continued**

Field	Description
TRAFFIC STATUS	<p data-bbox="350 293 1094 480">View1 displays the call handling status for trunk, hunt, and attendant groups; View2 displays the call handling status for trunk and attendant groups only. For trunk groups, the reports indicate the number of queued calls during the previously completed measurement interval for the identified trunk groups.</p> <p data-bbox="350 498 1094 784">For hunt groups, the reports indicate the number of queued calls and abandoned calls during the previously completed measurement interval for the identified trunk groups. For the trunk group measurements, only the four trunk group numbers with the highest percentage of blocking are listed. The reports also display trunk group direction (two-way, outgoing, or incoming), the number of calls queued, the percentage of outgoing blocking (for outgoing and two-way trunks), and the percentage of all trunks busy.</p> <p data-bbox="350 802 1094 1118">For outgoing and two-way trunk groups that are only experiencing a high number in the %Time ATB field, no action is required since this just indicates that the trunks are being used very efficiently. However, a bad condition is when both the %Time ATB and %Out blkg fields are displaying high numbers, indicating that calls are arriving and being blocked because all trunks are already being used. For incoming trunk groups that are experiencing a high number in the %Time ATB field, then some incoming calls are probably being blocked.</p> <p data-bbox="350 1136 602 1171"><b>Suggested Actions:</b></p> <ol data-bbox="367 1189 1094 1494" style="list-style-type: none"><li data-bbox="367 1189 1094 1351">1. For outgoing and two-way trunk groups that are experiencing a high number in both the %Time ATB and %Out blkg fields, you should execute the <b>list performance trunk-group</b> command and follow the suggested actions that are specified for that command.</li><li data-bbox="367 1369 1094 1494">2. For incoming trunk groups that are experiencing a high number in the %Time ATB field, you should execute the <b>list performance trunk-group</b> command and follow the suggested actions that are specified for that command.</li></ol>

## Tone Receiver Summary Report

The Tone Receiver Summary Measurements Report provides traffic data for Dual Tone Multifrequency (DTMF) receivers, general purpose tone detectors (GPTDs), and Call Classifiers (CCs). DTMF receivers detect touch tones, GPTDs detect call progress tones. CCs can function either as Call Progress Tone Receivers (CPTRs), touch-tone receivers (TTRs), or multifrequency compelled receivers (MFCRs).

### NOTE:

Tone receivers are required to support the ARS, Terminal Dialing, Abbreviated Dialing, LND, and Call Prompting features. Refer to the *DEFINITY Enterprise Communications Server Release 5 System Description Pocket Reference*, for additional details.

Reports can be requested on tone receiver activity for yesterday's peak hour, today's peak hour, or the last hour. The peak is the hour of the day with the highest `Peak Req` measurement. The data in this report can be used to determine if there is a need for additional Tone Detector or Tone Detector/Generator circuit packs.

## Command

To display the Tone Receiver Summary Measurements Report screen, enter:

**list measurements tone-receiver summary  
last-hour/today-peak/yesterday-peak [print/schedule]**

Options: Options are **yesterday-peak** for yesterday's report, **today-peak** for today's report, or **last-hour** for a report of the activity from the last completed measurement hour.

## Screen

[Screen 3-38](#) depicts an example of a typical screen for the Tone Receiver Measurements Summary Report screen. [Table 3-32](#) describes the data fields presented in the Tone Receiver Measurements Summary Report.

```

Switch Name:
Date: 11:27 am MON JUL 17, 19xx

TONE RECEIVER SUMMARY MEASUREMENTS
Total Peak Total Peak Total Peak
Hour Type Req Req Queued Queued Denied Denied
1000 DTMF 0 0 0 0 0 0
1000 GPTD 0 0 0 0 0 0
1000 CC-TTR 0 0 0 0 0 0
1000 CC-CPTR 0 0 0 0 0 0
1000 CC-MFCR 0 0 0 0 0 0

TR Type Total Avail Capabilities
DTMR-PT 4 DTMF
GPTD-PT 2 GPTD
CLAS-PT 0 DTMF,CC-TTR,CC-CPTR,MFCR
ETR-PT 0 DTMF,CC-TTR,CC-CPTR,MFCR,GPTD
    
```

Command successfully completed

Command:

### Screen 3-38. Tone Receiver Measurements Report

**Table 3-32. Tone Receiver Measurements Summary Report**

Field	Description
Hour	<i>Measurement Hour.</i> The starting time (using 24-hour clock) of the last hour or the hour with the highest Peak Req measurement.
Type	The type of tone receiver being measured.
Total Req	<i>Total Requests.</i> The system-wide total number of requests, by call processing, for DTMF, GPTD, CC-TTR, CC-CPTR, or MFCR receivers during the listed hour. The total number of requests is calculated by incrementing a counter for each request.
Peak Req	<p><i>Peak Requests.</i> The system-wide peak number of simultaneous requests for DTMF, GPTD, CC-TTR, CC-CPTR, or MFCR receivers that occurred at any one time for the listed hour. The peak (or maximum) number is calculated by incrementing a counter for each request, and decreasing the counter when the request fails or a tone receiver is released.</p> <p><b>⇒ NOTE:</b>                      If the Peak Req field indicates a number higher than listed in the Avail field, then certain requests were either queued or denied during the peak time interval. Denied requests fail and are given the reorder tone.</p>
Total Queued	<p>The system-wide total number of requests that were queued during the listed hour. A request is queued when there are no receivers immediately available. Only DTMF and CC-TTR requests are queued.</p> <p><b>⇒ NOTE:</b>                      If a request for a receiver is made in one port network, and no receivers are available, then the request is offered to the next port network. If no receivers are available on any port network, then the request is queued. Queued call requests do not receive dial tone until a tone receiver becomes available.</p>
Peak Queued	<p>The system-wide maximum number of call requests that were queued at any one time during the listed hour.</p> <p><b>⇒ NOTE:</b>                      The system has a maximum queue size of 4 for DTMF requests and 80 for CC-TTR call vectoring requests.</p>

*Continued on next page*

**Table 3-32. Tone Receiver Measurements Summary Report — Continued**

Field	Description
Total Denied	The system-wide total number of requests that were denied because no receivers were available during the listed hour. For DTMF-receiver or CCTR requests, this happens only after the queue is full. Those requests that are denied are given reorder tone.
Peak Denied	The system-wide peak number of requests that were denied because no receivers were available during the listed hour.  <b>Suggested Action:</b> At a minimum you should increase the number of tone receivers by the number that is displayed in the Peak Denied field. Furthermore, you may want to consider engineering the switch as “non-blocking” for tone receivers. This would involve increasing the number of tone receivers (the Avail field) so that all requests receive service immediately and no requests are queued. For example, just keep the value displayed in the Avail field greater than that displayed in the Peak Req field.
TR Type	<i>Tone Receiver Type.</i> The tone receiver circuit packs that are in physically connected at the time of the hour measurement.
Total Avail	<i>Total Available.</i> The number of the ports available for the type of tone receiver listed in the previous column.
Capabilities	The types of tone(s) that the tone receiver can detect.

## Tone Receiver Detail Report

The Tone Receiver Measurements Detail Report provides traffic data for Dual Tone Multifrequency (DTMF) receivers, general purpose tone detectors (GPTDs), and Call Classifiers (CCs) as Call Progress Tone Receivers (CC-CPTRs) for call classification, as touch-tone receivers (CC-TTRs) for call vectoring, as multifrequency compelled receivers (MFCRs), and DTMF receivers.

**➤ NOTE:**

Tone receivers are required to support the ARS, Terminal Dialing, Abbreviated Dialing, LND, and Call Prompting features. Refer to the *DEFINITY Enterprise Communications Server Release 5 System Description Pocket Reference*, for additional details.

Reports can be requested on tone receiver activity for yesterday's peak hour, today's peak hour, or the last hour. The peak is the hour of the day with the highest Peak Req measurement. The data in this report can be used to determine if there is a need for additional Tone Detector or Tone Detector/Generator circuit packs.

## Command

To display the Tone Receiver Measurements Detail Report screen, enter:

**list measurements tone-receiver detail [options]**

**Options:** Options are **yesterday-peak** for yesterday's report, **today-peak** for today's report, or **last-hour** for a report of the activity from the last completed measurement hour.

## Screen

[Screen 3-39](#) and [Screen 3-41](#) depict an example of a typical screen for the Tone Receiver Measurements Detail Report screen for a two-port network system. [Table 3-33](#) describes the data fields presented in the Tone Receiver Measurements Detail Report. One page of data is displayed per port network.

```
list measurements tone-receiver detail last-hour                Page 1
Switch Name: Cust_Switch_Name                                Date: 3:16 pm TUE OCT 17, 19xx
      TONE RECEIVER DETAIL MEASUREMENTS
Hour   PN      Type      PN      Peak      Total      Peak
      Req   Alloc   Alloc   OFF-PN   OFF-PN
1400   1      DTMF      8       8         3         0         5
1400   1      GPTD     12      12         0         0
1400   1      CC-TTR    0       0         0         0
1400   1      CC-CPTR   0       0         0         0
1400   1      CC-MFCR   0       0         0         0

Press CANCEL to quit - press NEXT PAGE to continue
```

**Screen 3-39. Tone Receiver Detailed Measurements Report — Page 1**

**Table 3-33. Tone Receiver Detailed Measurements Report**

Field	Description
Hour	<i>Measurement Hour.</i> The starting time (using 24-hour clock) of the last hour or of the hour with the highest Peak Req measurement.
PN	<i>Port Network.</i> The port network in which the circuit pack containing the type of tone receiver listed is physically located.
Type	<p data-bbox="337 551 488 578"><b>NOTE:</b></p> <p data-bbox="406 587 1074 775">Each TN748 and TN420 circuit pack provides four DTMF ports (for touch-tone reception) and two GPTD ports (for call progress tone reception). The TN744 Call Classifier Circuit Pack provides eight ports for call progress tone reception (CC-CPTR), touch-tone reception (CC-TTR), or MFC (CC-MFCR) reception.</p>
PN Req	<i>Port Network Requests.</i> The number of requests for DTMF, GPTD, CC-TTR, CC-CPTR, or MFCR receivers within the port network during the listed hour.
PN Alloc	<i>Port Network Total Allocation.</i> The total number of DTMF, GPTD, CC-TTR, CC-CPTR, or MFCR receivers located in the listed port network that were allocated for use during the listed hour.

**Continued on next page**

**Table 3-33. Tone Receiver Detailed Measurements Report — Continued**

Field	Description
Peak Alloc	<p><i>Peak Allocation.</i> The peak number of DTMF, GPTD, CC-TTR, CC-CPTR, or MFCR receivers located in the listed port network that were in use simultaneously during the listed hour.</p>
Total Off-PN	<p><i>Total Off-Port Network.</i> For the identified hour and port network, this is the total number of DTMF, GPTD, CC-TTR, CC-CPTR, or MFCR receivers that were allocated on a different port network for requests originated on this port network.</p> <p><b>⇒ NOTE:</b>                      With ideal conditions, this field will display the number 0. However, with more practical conditions, the field will display a larger number.</p> <p><b>Suggested Actions:</b> Locate communities of interest within the same port network. Provide sufficient tone receivers for each port network.</p>
Peak Off-PN	<p><i>Peak Off-Port Network.</i> For the identified hour and port network, this is the peak number of DTMF, GPTD, CC-TTR, CC-CPTR, or MFCR receivers that were simultaneously allocated on a different port network for requests originated on this port network.</p> <p><b>⇒ NOTE:</b>                      A desirable goal is to minimize (within reason) the number displayed with this field.</p> <p><b>Suggested Actions:</b> Locate communities of interest within the same port network. Provide sufficient tone receivers for each port network. Perhaps you should move one TN748 and TN420 circuit pack (or, if you are working with a CC-TTR, CC-CPTR, and MFCR, move a TN744 circuit pack) to the PN with the Off-PN counts to minimize Off-PN allocations.</p>

## Traffic Summary Report

---

The Traffic Summary Report provides an overview of system performance. Summarized in the report are peak hour call processing and system management occupancy, peak hour blocking for tdm time slots on each port network, peak hour blocking for port network links and switch node links, and the peak hour for the tdm timeslots, port network links and switch node links combined, peak hour for the worst attendant speed of service, and the peak for today and yesterday for trunk blocking for the worst five trunk groups.

Also included are a series of traffic flags and counters that are provided for the last hour of measurement data. They include a time stamp for a major alarm, trunk group, wideband trunk group, coverage path, coverage principals, and routing-pattern time stamps for measurement selection modifications.

There are, as well, for last hour, totals for Trunks Out of Service, CDR high water mark and overflow and total security violations.

### NOTE:

Data in this report is not updated on demand. It is generated every hour on the hour and can be used to identify problem areas in the system. More detailed data can be retrieved from other measurements reports, as noted in the field descriptions.

When a potential problem is identified from this report, other more detailed reports in the suspect area are required to adequately characterize the problem.

## Command

---

To display the Traffic Summary Report screen, enter:

**list measurements summary [print/schedule]**

**Options:** The print and schedule options are available for this command.

## Screen

[Screen 3-40](#), [Screen 3-41](#) and [Screen 3-42](#) show the Traffic Summary Report screens. [Table 3-34](#) describes the data fields for this screen.

```
list measurements summary
Switch Name: Cust_Switch_Name                               Date: 8:13 am THRU SEP 19, 19xx
                                     TRAFFIC SUMMARY REPORT
                                     Last Hour Today's Yesterday's
OCCUPANCY MEASUREMENTS
  Meas Hour:           700           500           1300
Static Occupancy:     7             7             0
  CP Occupancy:       0             3             5
  SM Occupancy:      18             1             16
BLOCKAGE MEASUREMENTS
  Meas Hour:           700           700           2300
Total Blockage:       0             0             0
  High PN Blk:        0             0             0
High SNL/PNL Blk:    0             0             0
ATTENDANT SPEED MEASUREMENTS
  Meas Hour:           700           700           2300
Attendant Speed:     0             0             0
```

### Screen 3-40. Traffic Summary Report — Page 1

```
list measurements summary
Switch Name: Cust_Switch_Name                               Date: 8:13 am THRU SEP 19, 19xx
                                     TRAFFIC SUMMARY REPORT
                                     TRAFFIC FLAGS
Major Alarm: NO MAJOR ALARM
Trunk Group: 11:08 pm SEP 16, 19xx
Wideband Trunk Group: 11:08 pm SEP 16, 19xx
Coverage Path: 11:08 pm SEP 16, 19xx
Covered Principals: 11:08 pm SEP 16, 19xx
Route Pattern: 11:08 pm SEP 16, 19xx
Total Trunks Out of Service: 4
Security Violations: 0
CDR High-Water-Mark: 0
CDR Overflow: 0
```

### Screen 3-41. Traffic Summary Report — Page 2

```
list measurements summary
Switch Name: Cust_Switch_Name                Date: 8:13 am THRU SEP 19, 19xx
TRAFFIC SUMMARY REPORT
```

FIVE TRUNK GROUPS LOWEST SPEED OF SERVICE

```
-----Today's Peak-----      -----Yesterday's Peak-----
Grp No  Meas Hour  %ATB      Grp No  Meas Hour  %ATB
30      700        100       30      2300       100
40      700         0         40      1000        5
39      700         0         39      2300         0
38      700         0         38      2300         0
37      700         0         37      2300         0
```

Screen 3-42. Traffic Summary Report — Page 3

Table 3-34. Traffic Summary Report

Field	Description
Meas Hour	<i>Measurement Hour</i>
Static Occupancy	<i>Static Occupancy.</i> The percentage of processor occupancy required by background processes in support of call processing, maintenance, and system management. Examples of this activity are high-level sanity checks, system timing, and polling of adjuncts.
CP Occupancy	<i>Call Processor Occupancy.</i> The percentage of processor occupancy due to high priority processing and dynamic call processing. The peak hour is determined by the hour with the largest combined call processing and static occupancy. Refer to <a href="#">Screen 4-1</a> to correlate data as well as to determine necessary actions.
SM Occupancy	<i>System Management Processor Occupancy.</i> The percentage of processor occupancy due to system management processes. This measurement is time coincident with the peak value of the combined call processing and static processor occupancy.
Total Blockage	The percent of total circuit switched time slot seizures that were blocked due to insufficient TDM or CSS time slots. <i>Total Blocking = ( (TDM Blockage + SNL Blockage + PNL Blockage) x 100) / (TDM Pegs + SNL Pegs + PNL Pegs)</i>

**Continued on next page**

**Table 3-34. Traffic Summary Report — Continued**

Field	Description
High PN Blk	<p><i>Highest PN Blk.</i> The highest percent of TDM time slot seizure failures due to insufficient time slots for any PN. This is time coincident with Peak Total Blocking, above. It is computed as follows <math>Highest\ PN\ Blk = (TDM\ Blockage \times 100) / TDM\ Pegs</math></p>
High PNL/SNL Blk	<p><i>Highest PNL/SNL Blk (Release 5r only).</i> The highest percent of SNL and PNL seizure failures due to insufficient time slots. This measurement is only meaningful for links between Center Stage Nodes or T1 remote PNs since connectivity to the Center Stage from any PN is non-blocking with fiber connectivity. This is time coincident with Peak Total Blocking. It is computed as follows <math>Highest\ PNL/SNL\ Blk = ((SNL\ Blockage + PNL\ Blockage) * 100) / (SNL\ Pegs + PNL\ Pegs)</math></p> <p>The data from Total Block, High PN Block and High PN/SNL Block can be correlated to data on the Blockage PN and Blockage SN Reports. The peak hour has the worst total (TDM, PNL and SNL) blockage.</p>
Attendant Speed	<p><i>Attendant Group Speed of Service</i> The average time that calls are in the attendant queue. The peak hour has the slowest speed of service.</p> <p><math>Attendant\ Speed = Total\ Delay\ for\ all\ Answered\ Call\ (in\ seconds) / Total\ Number\ of\ Calls\ Answered</math></p> <p><b>Suggested Action</b> If the speed of answer is not acceptable, review the attendant group and attendant positions reports for suggested actions.</p>
Major Alarm	<p>The time stamp of the last major alarm that was active when the report was generated for the last hour.</p> <p><b>Suggested Action</b> If measurement data on reports seems inconsistent, further study of alarms may point to a potential problem ("display alarms").</p>
Trunk Group	<p>Time stamp that indicates when the Trunk Groups Measurement Selection form was last updated. This time stamp is retrieved when the measurements for the Trunk Group Hourly Report are collected each hour.</p>
Wideband Trunk Group	<p>Time stamp that indicates when the Wideband Trunk Group Measurement Selection form was last updated. This time stamp is retrieved when the measurements for the Wideband Trunk Group Hourly Report are collected each hour.</p>

*Continued on next page*

**Table 3-34. Traffic Summary Report — Continued**

Field	Description
Coverage Path	Time stamp that indicates when the Coverage Measurement Selection form was last updated. This time stamp is retrieved when the measurements for the associated report(s) are collected each hour.
Covered Principals	Time stamp that indicates when the Principal Measurement Selection Administration Form was last updated. This time stamp is retrieved when the measurements for the associated report(s) are collected each hour.
Route Pattern	Time stamp that indicates when the Measurement Route Pattern Selection Administration Form was last updated. This time stamp is retrieved when the measurements for the associated report(s) are collected each hour. The time at which the identification of routing patterns to be studied was last changed.
Total Trunks Out of Service	The total number of trunks out of service for the entire system as of the last hour. Refer to <a href="#">Screen 3-47</a> for more details and suggested actions.
Security Violations	The total number of security violations, login, barrier code, and authorization code, as recorded in the Security Violations Summary Report. Generally, this number should not be high. If it is, refer to <a href="#">Screen 5-1</a> and <a href="#">Screen 5-2</a> for suggested actions.
CDR High Water Mark	The number of times during the measurement interval that the CDR Record Buffer High Water Mark was exceeded. This is a warning level reached when the number of CDR records stored on the switch is close to the maximum number of buffers allocated.

**Continued on next page**

**Table 3-34. Traffic Summary Report — Continued**

Field	Description
CDR Overflow	The number of times during the last hour that the CDR record buffer overflowed invoking the administration selectable overflow response. Special handling procedures occur when all CDR buffers are filled. To prevent undesired loss of data, options will be put in effect to redirect calls generating CDR records to the attendant or to give those calls intercept treatment.  <b>Suggested Actions</b> Both the above conditions may indicate that the CDR primary link is down and that maintenance tests should be done to check that the link doesn't have hardware problems ("test cdr-link primary").
Grp No	The trunk group number.
% ATB	<i>Percent All Trunks Busy.</i> The observed blocking as determined by All Trunks Busy (ATB) for the trunk group. This is reported for the 5 trunk groups with the highest % ATB for today and yesterday.

## Trunk Group Reports

This section describes the traffic, outage, performance, status, call-by-call, and lightly used reports for Trunk Groups, and describes the validation and analysis of the data provided in the reports.

## Trunk Group Summary Report

The Trunk Group Summary Report gives traffic measurements for all trunk groups except for Personal Central Office Line Groups. By using this report, you can determine the trunk group total usage (in CCS), the total number of calls, trunk blockage, and other measurement data.

## Command

To display the Trunk Group Summary report, enter:

**list measurements trunk-group summary [option] [print/schedule]**

**Options:** Options are **yesterday-peak** for a report of yesterday's peak trunk activity, **today-peak** for a report of today's peak trunk activity, or **last-hour** for a report of the trunk activity of the most recently completed hour. The peak hour is the hour within a 24-hour period that had the greatest usage for the specified 24-hour period.

## Screen

[Screen 3-43](#) shows a typical screen for the Trunk Group Summary Report. [Table 3-35](#) describes the data fields presented in the Trunk Group Summary Report.

```
list measurements trunk-group summary last-hour
Switch Name: Cust_Switch_Name                               Date: 1:58 pm MON SEP 16, 19xx
                                     TRUNK GROUP SUMMARY REPORT
Peak Hour For All Trunk Groups: 1000 (W = Wideband Support)
Grp Grp Grp Grp Meas Total Total Inc. Grp Que Call Que Que Out % Out
No. Siz Type Dir Hour Usage Seize Seize Ovfl Siz Qued Ovf Abd Srv ATB Blk
20 1 did inc 1200 0 0 0 0 0 0 0 0 0 0 0 0 0 *
30 1 tie two 1200 36 0 0 0 0 0 0 0 0 0 0 100 0
37 22 tand two 1200 598 179 0 0 0 0 0 0 0 0 0 0 0 0
38 23 isdn two 1200 171 654 0 0 0 0 0 0 0 0 0 0 0 0 W
39 22 isdn two 1200 270 762 762 0 0 0 0 0 0 0 0 0 0 0 0
40 5 co two 1200 61 32 0 6 0 0 0 0 0 0 0 6 15
```

**Screen 3-43. Trunk Summary Report**

**Table 3-35. Trunk Group Summary Report**

Field	Description
Peak Hour for All Trunk Groups	The hour during the specified day that has the largest total usage, when summed over all trunk groups. Peak hour and busy hour are synonymous. With conventional traffic theory data analysis, there are two methods for determining the peak hour. One is the time-coincident peak hour, meaning that hourly usage values are averaged across days for each hour of the day. The other is the bouncing peak hour, meaning that the highest usage is selected for each day without regard to the average across days. For the bouncing peak hour the highest load on a given day may or may not occur during the time-coincident busy hour. These traffic reports and accompanying trunk group data worksheet only use the bouncing peak hour method. Note that if the total usage for the current hour equals the total usage for the previous peak hour, then the peak hour is the hour with the greatest number of total seizures.
Grp No.	<i>Group Number.</i> A number that identifies each trunk group associated with the displayed data. Group numbers are displayed in numerical order, beginning with the lowest administered number and continuing to the highest administered number.
Grp Siz	<i>Group Size.</i> The number of administered trunks in the trunk group.
Grp Type	<i>Group Type.</i> The type of trunk in the trunk group. The system monitors/measures the following trunk types: Access Tie Trunk ( <i>Access</i> ) Advanced Private Line Termination ( <i>ap1t</i> ) Central Office ( <i>co</i> ) or Public Network Service Customer Provided Equipment ( <i>cpe</i> ) Direct Inward Dialing ( <i>did</i> ) Direct Inward/Outward Dialing ( <i>dioid</i> ) Digital Multiplexed Interface Bit Oriented Signaling ( <i>dmi-bos</i> ) Foreign Exchange ( <i>fx</i> ) Integrated Services Digital Network ( <i>isdn-pri</i> ) Release Link Trunk ( <i>r1t</i> ) Tandem ( <i>tan</i> ) Tie Trunk ( <i>tie</i> ) Wide Area Telecommunications Service ( <i>wats</i> )
Grp Dir	<i>Trunk Group Direction.</i> Identifies whether the trunk group is incoming ( <i>inc</i> ), outgoing ( <i>out</i> ), or two-way ( <i>two</i> ).

**Continued on next page**

**Table 3-35. Trunk Group Summary Report — Continued**

Field	Description
Meas Hour	<i>Measurement Hour.</i> The hour (using 24-hour clock) in which the measurements are taken. For the <b>last-hour</b> report, it is the last hour of measurement (each trunk group's measurement hour is identical; but not necessarily the same as the indicated peak hour for the day). For the <b>today-peak</b> report, the measurement hour is the peak hour for each trunk group thus far today (each trunk group's measurement hour could be different). For the <b>yesterday-peak</b> report, the measurement hour is the peak hour for each trunk group yesterday (each trunk group's measurement hour can be different).
Total Usage <sup>1</sup>	Total usage (in CCS) for all trunks in the trunk group. Represents the total time the trunks are busy (with calls) during the one-hour measurement period. Total usage measures each time a trunk is seized for use by an incoming call (wether it is picked up or not) or an out going call (only after digits have been dialed).
Total Seize	The number of incoming and outgoing seizures carried on the trunk group. This would include the number of times a trunk in the group was seized, including false starts, don't answer and busy.
Inc. Seize	<i>Incoming Seize.</i> The number of incoming seizures carried on the trunk group.
Grp Ovf	<i>Group Overflow.</i> The number of calls offered to a trunk group that are not carried or queued (if a queue is present). Calls rejected for authorization reasons are not included.
Que Siz	<i>Trunk Group Queue Size.</i> A number (zero to 100) that identifies the number of slots assigned to the trunk group queue. This number represents how many calls may be held in queue by the trunk group. If 0 is displayed, then no queue is administered. Hence, the other queue measurements will also be 0. Generally, the queue size should be larger than the trunk group size; but, typically not more than three times as large as the trunk group size.
Call Qued	<i>Calls Queued.</i> The total number of calls that entered the trunk group queue after finding all trunks busy.

**Continued on next page**

**Table 3-35. Trunk Group Summary Report — Continued**

Field	Description
Que Ovf	<p><i>Queue Overflow.</i> The total number of calls that were not queued because the queue was full. These calls receive a reorder signal.</p> <p><b>Suggested Actions:</b> Generally, this field will indicate the number 0. If this field indicates a high number, then:</p> <ol style="list-style-type: none"> <li>a. The queue size may be too small, or</li> <li>b. More trunks may need to be added to reduce the number of calls queuing.</li> </ol>
Que Abd	<p><i>Queue Abandoned.</i> The number of calls that were removed from the queue in one of the following manners:</p> <ul style="list-style-type: none"> <li>■ By the system because they have been in the queue for more than 30 minutes</li> <li>■ By the user (for example, dialing the cancel code).</li> </ul> <p><b>Suggested Action:</b> Typically, this field will indicate a small number. However, a large number will generally indicate that the queue size is too large and that people are abandoning because they have remained in queue for a long holding time and give up.</p>
Out Srv	<p><i>Out of Service.</i> The number of trunks in the trunk group that are out of service (listed as maintenance busy) at the time data is collected. An individual trunk may be taken out of service (a) by the switch whenever an excessive number of errors occur, or (b) by maintenance personnel to run diagnostic tests.</p> <p><b>Suggested Action:</b> If the trunks were removed from service by the switch, then the appropriate maintenance personnel should be notified. The objective is to keep all members of a trunk group "in service." Generally, you should not make adjustments to the trunk group because of "Out of Service" trunks, but should get those trunks returned to service. Refer to "<a href="#">Trunk Outage Measurements Report</a>" for specific details.</p>

*Continued on next page*

**Table 3-35. Trunk Group Summary Report — Continued**

Field	Description
% ATB	<p data-bbox="350 293 1086 383"><i>Percentage all trunks busy.</i> The percentage of time that all trunks in the trunk group were simultaneously in use during the measurement interval.</p> <p data-bbox="350 419 1086 508"><b>⇒ NOTE:</b>                      In use means that the trunks were busy — either serving calls, or because they were busied-out by maintenance.</p> <p data-bbox="350 544 1086 580"><b>Suggested Actions:</b></p> <ol data-bbox="350 598 1086 1130" style="list-style-type: none"> <li data-bbox="350 598 1086 939">1. If the group direction is outgoing or two-way, then a high number in the % ATB field and nothing in the <code>Grp Ovf1</code> or <code>Que Ovf1</code> would indicate that everything is functioning normally. However, a more typical scenario would be a high number in this field and also a high number in the <code>Grp Ovf1</code> field. This would indicate a possible problem that necessitates further analysis. Unless it is the last trunk group in the pattern, overflow is to the next choice trunk group, and the number in the <code>Grp Ovf1</code> field is of no great significance. Otherwise, the obvious choice is to add more trunks to the trunk group.</li> <li data-bbox="350 956 1086 1130">2. If the group direction is incoming, then a high number in this field is bad. It indicates that some incoming calls are probably being blocked. Generally, you will want to add more trunks, thus lowering the % ATB and decreasing the number of calls that are being blocked.</li> </ol>

*Continued on next page*

**Table 3-35. Trunk Group Summary Report — Continued**

Field	Description
<p>% Out Blk</p>	<p><i>Percentage Outgoing Blocking.</i> The percentage of offered calls that are not carried on the trunk group. It does not include unauthorized calls that are denied service on the trunk group (due to restrictions) or calls that are carried on the trunk group but do not successfully complete at the far end (that is, where there is no answer). For trunk groups without a queue, the calls not carried are those calls that arrive when all trunks are busy. The number of Outgoing Seizures is calculated as follows:</p> $\text{Outgoing Seizures} = \text{Total Seizures} - \text{Incoming Seizures}$ <p>Similarly, the equation for calculating Outgoing Calls Offered is as follows:</p> $\text{Outgoing Calls Offered} = \text{Group Overflow} + \text{Outgoing Seizures}$ $\% \text{ OutBlk} = \left[ \frac{\text{Group Overflow}}{\text{Outgoing Calls Offered}} \right]$ <p>For trunk groups with a queue, the calls not carried are those calls that arrive when all trunks are busy and the queue is full (Queue Overflow) and calls that are removed from queue before being carried (Queue Abandoned). For this scenario, the Percentage Outgoing Blocking is calculated as follows:</p> $\text{Outgoing Calls Offered} = \text{Que Ovf} + \text{Que Abd} + \text{Outgoing Seizures}$ $\% \text{ OutBlk} = \left[ \frac{\text{Queue Overflow} + \text{Que Abd}}{\text{Outgoing Calls Offered}} \right] \times 100$ <p><b>Suggested Actions:</b></p> <ol style="list-style-type: none"> <li>1. You can increase the length of the queue rather than adding more trunks. Subsequently, you should monitor the Que Abd field to insure that it stays within reasonable limits.</li> <li>2. If conditions are such that Step 1 is not appropriate, then you may find it necessary to add more trunks.</li> </ol> <p><b>⇒ NOTE:</b>                      If you are using ARS you may see a high number in this field. This only indicates that calls are overflowing to the next choice.</p>

**Table 3-35. Trunk Group Summary Report — Continued**

---

<b>Field</b>	<b>Description</b>
Wideband Flag	If the trunk group supports wideband (n X DS0) switching, a "W" appears next to the trunk group entry. In addition, if any trunk group on the report supports wideband switching, the tag "W = Wideband Support" appears in the report heading.

---

- 
1. The usage that wideband calls contribute to this measurement is proportional to the resources that the calls consume. For example, a 384-kbps call contributes six times more to the total usage than does a 64-kbps call.
- 

## **Trunk Group Hourly Report**

---

The Trunk Group Hourly Report provides data necessary to validate the information in the Trunk Group Summary Report and to size the trunk groups. A separate report is generated for each trunk group. On the Release 5r, a maximum of 75 trunk groups can be studied hourly at the same time. On the Release 5si, a maximum of 25 trunk groups can be studied.

### **⇒ NOTE:**

In order to display these hourly reports, you must first complete the Trunk Group Measurement Selection Form. The Trunk Group Measurement Selection Form is explained immediately after this section about the Trunk Group Hourly Report.

## **Command**

---

To display the Trunk Group Hourly Report, enter:

**list measurements trunk-group hourly <trunk group no.> [print/schedule]**

**Options:** The print and schedule options are available for this command.

## Screen

Screen 3-44 shows a typical screen for the Trunk Group Hourly Report. [Table 3-36](#) and [Table 3-37](#) describe the data fields presented in the Trunk Group Hourly Report. The report contains two sections: a header section that provides report ending time and trunk group administrative information; and a data section that provides the measurement data for 24 hours.

Note that if a translation change has occurred during a particular hour, an asterisk (\*) appears in front the data for the hour in which the translation change occurred.

```
list measurements trunk-group hourly 40
Switch Name: Cust_Switch_Name                Date: 1:58 pm MON SEP 16, 19xx
                TRUNK GROUP HOURLY REPORT — WIDEBAND Support
Grp No: 40      Grp Size: 5      Grp Type: isdn  Grp Dir: two  Que Size: 0
Meas  Total  Maint  Total  Inc.  Tandem  Grp  Call  Que  Que  Out  %  %Out
Hour  Usage  Usage  Seize  Seize  Seize  Ovfl  Qued  Ovf  Abd  Srv  ATB  Blk
1200  61     0     32     0     0     6    0    0    0    0    6  15
1100  62     0     33     0     0     0    0    0    0    0    0  0
1000  69     0     63     0     0     4    0    0    0    0    3  5
*900  26     0     0      0     0     0    0    0    0    0    0  0
 800  1      1     4      0     0     0    0    0    0    0    0  0
```

### Screen 3-44. Trunk Group Hourly Report

**Table 3-36. Trunk Group Hourly Report (Header)**

Field	Description
Grp No	<i>Group Number.</i> A number that identifies the trunk group associated with the displayed data.
Grp Size	<i>Group Size.</i> Number of trunks in the trunk group.
Grp Type	<i>Group Type.</i> All trunk group types except PCOL trunk groups.
Grp Dir	<i>Group Direction.</i> Incoming, outgoing, or two-way.
Que Size	<i>Queue Size.</i> The size of the trunk group queue. If there is no queue, the size is zero and the other queue measurements are irrelevant.

**Table 3-37. Trunk Group Hourly Report (Data)**

Field	Description
Meas Hour	<i>Measurement Hour.</i> The starting time (using 24-hour clock) of the hour during which the data was recorded.
Total Usage <sup>1</sup>	The total time (in CCS) trunks in the trunk group are unavailable to carry a new call. It includes time the trunks are busy on calls, false starts, don't answers, or any other reason the trunk is unavailable. Not included are calls denied service on the trunk group for authorization reasons or because of queue overflow.
Maint Usage	<i>Maintenance Usage.</i> The total usage (in CCS) of trunks in this trunk group for Maintenance Busy or any other non-call situation where trunks are not available to carry a call.
Total Seize	<i>Total Seizures.</i> The total number of seizures on the trunk group.
Inc. Seize	<i>Incoming Seizures.</i> The number of incoming seizures on the trunk group.
Tandem Seize	<i>Tandem Seizures.</i> The number of trunk-to-trunk call seizures. This count is incremented on the outgoing-trunk side of the connection.
Grp Ovfl	<i>Group Overflow.</i> The outgoing calls offered to the trunk that are not carried. These are the calls that arrive when all trunks in the group are busy and are not queued on the trunk group. It does not include the calls that are denied service on the trunk group because of authorization reasons.
Call Qued	<i>Calls Queued.</i> The calls that enter the trunk group queue. This can happen automatically for analog terminal users or at the request of the caller for other terminal types.
Que Ovfl	<i>Queue Overflow.</i> The number of calls that arrive when all slots in the Trunk Group Queue are occupied.
Que Abd	<i>Queue Abandoned.</i> Calls that are removed from the queue either by the system because they have been in the queue for the maximum allowed time (currently fixed at thirty minutes), or forced by users when they cancel the auto-call back, set earlier to put the call in the queue.
Out Serv	<i>Out of Service.</i> The number of trunks in the trunk group that were out of service at the time the data is collected.

**Continued on next page**

**Table 3-37. Trunk Group Hourly Report (Data) — Continued**

Field	Description
% ATB	<i>Percent All Trunks Busy.</i> The percentage of time during the measurement interval that all trunks in the group are unavailable to carry a new call (All Trunks Busy).
%Out Blk	<i>Percent Outgoing Blocking.</i> The percent of the outgoing seizures, including tandem seizures, offered to that trunk group that are not carried on that trunk group. The value is calculated as follows: $\% \text{ Out Blk} = \{Grp \text{ Ovfl} / [Total \text{ Seize} - Inc \text{ Seize}]\} \times 100$
Wideband Flag	If the trunk group supports wideband (n X DS0) switching, "Wideband Support" appears in the report heading.

1. The usage that wideband calls contribute to this measurement is proportional to the resources that the calls consume. For example, a 384-kbps call contributes six times more to the total usage than does a 64-kbps call.

## Trunk Group Measurement Selection Form

To specify which trunk groups to monitor for the Trunk Group Hourly Report, use the Trunk Group Measurement Selection Form. The Summary Report lists all administered trunks. You can administer a maximum of 75 trunk groups for the hourly report studied hourly on the Release 5r; on the Release 5si, the maximum is 25. If you do not select which trunk groups to study, none will appear on the hourly report.

### Command

To display the Trunk Group Measurement Selection Form, enter:

**change/display meas-selection trunk-group [print/schedule]**

**Options:** The print and schedule options are available with the **display** command only.

**Screen**

[Screen 3-45](#) shows a typical screen for the Trunk Group Measurement Selection Form on the Release 5r. [Table 3-38](#) describes the data fields presented in the Trunk Group Measurement Selection Form.

```

display meas-selection trunk-group
                TRUNK GROUP MEASUREMENT SELECTION
                Trunk Group Numbers
1:   78          16:  15          31:   96          46:  333          61:  580
2:   80          17:  16          32:   97          47:  444          62:  590
3:  666          18:  17          33:   98          48:  555          63:  591
4:    1          19:  18          34:  100          49:  101          64:  592
5:    2          20:  81          35:  120          50:  102          65:   10
6:    3          21:  82          36:  200          51:  103          66:   99
7:    4          22:  83          37:   22          52:  104          67:  357
8:    5          23:  88          38:  234          53:  201          68:  467
9:    6          24:  89          39:  245          54:  203          69:  665
10:   7          25:  90          40:  246          55:  205          70:  664
11:   9          26:  91          41:  247          56:  207          71:  663
12:  11          27:  92          42:  250          57:  209          72:  662
13:  12          28:  93          43:  255          58:  550          73:  661
14:  13          29:  94          44:  256          59:  560          74:  599
15:  14          30:  95          45:  257          60:  570          75:  588
    
```

**Screen 3-45. Trunk Group Measurement Selection**

**Table 3-38. Trunk Group Measurement Selection Form**

Field	Description
Trunk Group Numbers	Defines the trunk group(s) to be studied hourly.

## Trunk Group Performance Report

The Trunk Group Performance Report gives a graphical and numerical display of the peak hour blocking for each trunk group. You can display the Trunk Group Performance Report for the previous day or the current day (yesterday or today).

### Command

To display the Trunk Group Performance Report, enter:

**list performance trunk-group [option] [print/schedule]**

**Options:** The options available for this command are: **yesterday** for a report of yesterday's trunk activity, **today** for a report of today's activity, **print** or **schedule**.

### Screen

[Screen 3-46](#) shows a typical screen for the Trunk Group Performance Report. [Table 3-39](#) describes the data fields presented in the Trunk Group Performance Report.

```
list performance trunk-group yesterday
Switch Name:  Cust_Switch_Name           Date: 4:28 pm SAT MAY 19, 19xx
      HIGHEST HOURLY TRUNK GROUP BLOCKING PERFORMANCE
Grp Grp  Grp Grp  --% Outgoing Blocking or % ATB-- %Out  %Time Meas  Total
No.  Type Dir Size  1 2 3 4 5 6 7 8 9 10 20 30 40 50 Blkg  ATB   Hour  Calls
1  fx   in  6    ////////////////////////////////////////////////// *    9    1200  876
2  wats in  5    ////////////////////////////////////////////////// *    30   1400   94
3  tie  two 14    //////////////// 7    36   1300  312
5  did  in 10    ////////////////////////////////////////////////// *    99   1300  542
12 co   two 18    //////////////// 9    96   1400  614
23 tie  two 7    //////////////// 18   81   1400  359
41 tie  two 8    //////////////// 26   91   1300  411
221 tie two 5    //////////////// 11   77   1300  109
Command successfully completed
Command:
```

### Screen 3-46. Trunk Group Performance Report

**Table 3-39. Trunk Group Performance Report**

Field	Description
Grp No.	<i>Group Number.</i> A number that identifies the trunk group associated with the displayed data.
Grp Type	<p><i>Group Type.</i> The type of trunk associated with the accumulated data. The system monitors the following trunk types (see <i>DEFINITY Enterprise Communications Server Release 5 Administration and Feature Description</i>):</p> <ul style="list-style-type: none"> <li>■ Access (<i>access</i>)</li> <li>■ Advanced Private Line Termination (<i>aplt</i>)</li> <li>■ Central Office (<i>co</i>) or Public Network Service</li> <li>■ Customer Provided Equipment (<i>cpe</i>)</li> <li>■ Direct Inward Dialing (<i>did</i>)</li> <li>■ Direct Inward/Outward Dialing (<i>diod</i>)</li> <li>■ Digital Multiplexed Interface Bit Oriented Signaling (<i>dmi-bos</i>)</li> <li>■ Foreign Exchange (<i>fx</i>)</li> <li>■ Integrated Services Digital Network (<i>isdn-pri</i>)</li> <li>■ Release Link Trunk (<i>rlt</i>)</li> <li>■ Tandem (<i>tandem</i>)</li> <li>■ Tie Trunk (<i>tie</i>)</li> <li>■ Wide Area Telecommunications Service (<i>wats</i>)</li> </ul>
Grp Dir	<i>Trunk Group Direction.</i> Identifies whether the trunk group is incoming ( <i>inc</i> ), outgoing ( <i>out</i> ), or two-way ( <i>two</i> ).
Grp Size	<i>Group Size.</i> The number of trunks in the trunk group.
%Out Blkg	<i>Percentage Outgoing Blocking.</i> The percentage of calls that arrive when all trunks are busy.

*Continued on next page*

**Table 3-39. Trunk Group Performance Report — Continued**

Field	Description
% Outgoing Blocking or % ATB	<p data-bbox="360 288 1072 704"><i>Percent Outgoing Blocking or Percent All Trunks Busy. A graphical representation which is equivalent to the numerical value of calls offered but not carried. For two-way and outgoing trunk groups, peak hour blocking is the largest % Outgoing Blocking. For incoming trunks, peak hour is the largest % ATB. Since % Outgoing Blocking is meaningless for incoming trunks, it is displayed as * in that column. For trunk groups without a queue, calls not carried are those calls that arrive when all trunks are busy. For trunk groups with a queue, calls not carried are calls that arrive when all trunks are busy and the queue is full (Queue Overflow) and calls that are removed from queue before being carried (Queue Abandoned).</i></p> <p data-bbox="360 722 1072 817"><b>Suggested Actions:</b> If a trunk group has a higher percent of blocking than desired, you should determine the exact reason that the trunk group is blocking calls.</p> <ol data-bbox="375 835 1072 1317" style="list-style-type: none"> <li data-bbox="375 835 1072 964">1. The <b>Total Calls</b> field indicates the calling volume. If excessive blocking is because of calling volume alone, then consider the possibility of adding more members to the trunk group.</li> <li data-bbox="375 982 1072 1238">2. If excessive blocking is not because of calling volume, the reason might be because trunks are in the maintenance busy state. You can use the Trunk Outage Report (which is described next) to identify those trunks that are determined to be out of service. Furthermore, and as required, you can use the ACA feature to monitor any trunk group that is still experiencing unexplained excessive blockage.</li> <li data-bbox="375 1256 1072 1317">3. For identified problems, determine whether maintenance has been or should be alerted.</li> </ol>

*Continued on next page*

**Table 3-39. Trunk Group Performance Report — Continued**

Field	Description
% Time ATB	<p><i>Percent of Time All Trunks Busy.</i> The percent of time that all trunks in the trunk group were simultaneously in use during the measurement interval.</p> <p> <b>NOTE:</b> In use means that the trunks were busy — either serving calls, or because they were busied-out by maintenance.</p>
Meas Hour	<p><i>Measurement Hour.</i> The starting time (using 24-hour clock) of the hour during which the data was recorded.</p>
Total Calls	<p>The total number of calls (seizures) for the trunk group during the peak hour of blocking.</p>

## **Trunk Outage Measurements Report**

The Trunk Outage Measurements Report lists up to a maximum of five trunks (in each trunk group) that were out of service when sampled. The number of times the trunks were out of service when sampled is also given. The trunk outage data is kept for the current day, the previous day, and the last hour.

### **Command**

To display the Trunk Outage Measurements Report, enter:

**list measurements outage-trunk [option] [print/schedule]**

**Options:** The options available for this command are: **yesterday** for a report of yesterday's trunk activity, **today** for a report of today's trunk activity, **last-hour** for a report of the trunk activity of the most recently completed hour, **print** or **schedule**.

## Screen

---

The Trunk Outage Measurements Report screen is shown in [Screen 3-47](#). [Table 3-40](#) describes the data fields presented in the Trunk Outage Measurements Report.

```
list measurements outage-trunk yesterday
Switch Name: Cust_Switch_Name      Date: 4:01 pm SAT MAY 19, 19xx
                                TRUNK OUT OF SERVICE REPORT
(trunks sampled for "out-of-service" condition once each hour)
Grp   Grp   Grp   Grp   Grp   #Sampled
No.   Type  Dir   Size  Mbr#  Outages
1     co    two   20    2     1
1     co    two   20    4     8
1     co    two   20    5     3
1     co    two   20    6     2
4     wats  out   10    2     5
4     wats  out   10    4     3
4     wats  out   10    9     2
4     wats  out   10   10     1
Command successfully completed
Command:
```

### Screen 3-47. Trunk Outage Measurements Report

**Table 3-40. Trunk Outage Measurements Report**

Field	Description
Grp No.	<i>Group Number.</i> A number that identifies each trunk group associated with the displayed data.
Grp Type	<p data-bbox="341 370 1103 503"><i>Group Type.</i> The type of trunk associated with the accumulated data. The system monitors the following trunk types (see <i>DEFINITY Enterprise Communications Server Release 5 Administration and Feature Description</i>):</p> <ul style="list-style-type: none"> <li data-bbox="362 521 606 551">■ Access (<i>access</i>)</li> <li data-bbox="362 569 899 600">■ Advanced Private Line Termination (<i>aplt</i>)</li> <li data-bbox="362 618 929 648">■ Central Office (<i>co</i>) or Public Network Service</li> <li data-bbox="362 666 832 697">■ Customer Provided Equipment (<i>cpe</i>)</li> <li data-bbox="362 715 996 775">■ Digital Multiplexed Interface Bit Oriented Signaling (<i>dmi-bos</i>)</li> <li data-bbox="362 793 719 824">■ Direct Inward Dialing (<i>did</i>)</li> <li data-bbox="362 842 845 872">■ Direct Inward/Outward Dialing (<i>diod</i>)</li> <li data-bbox="362 890 669 921">■ Foreign Exchange (<i>fx</i>)</li> <li data-bbox="362 939 967 969">■ Integrated Services Digital Network (<i>isdn-pri</i>)</li> <li data-bbox="362 987 694 1017">■ Release Link Trunk (<i>rlt</i>)</li> <li data-bbox="362 1035 614 1066">■ Tandem (<i>tandem</i>)</li> <li data-bbox="362 1084 580 1114">■ Tie Trunk (<i>tie</i>)</li> <li data-bbox="362 1132 955 1163">■ Wide Area Telecommunications Service (<i>wats</i>)</li> </ul>
Grp Dir	<i>Group Direction.</i> Identifies whether the trunk group is incoming ( <i>inc</i> ), outgoing ( <i>out</i> ), or two-way ( <i>two</i> ).

**Continued on next page**

**Table 3-40. Trunk Outage Measurements Report — Continued**

Field	Description
Grp Size	<i>Group Size.</i> The number of trunks in the trunk group.
Grp Mbr#	<i>Group Member Number.</i> The number that identifies a specific trunk member (in the group) that is out of service.
#Sampled Outages	<p><i>Number of Sampled Outages.</i> The number of times the group member is sampled as out of service over the period covered by the report (yesterday, today, or last hour). Yesterday includes the 24 hours beginning at midnight and ending at midnight. Today includes those hours from midnight to the most recently completed hour. Last hour only includes the most recently completed hour.</p> <p><b>⇒ NOTE:</b>                      If there are no outages, then no data is displayed.</p> <p><b>Suggested Actions:</b></p> <ol style="list-style-type: none"> <li>1. The sampling period is once per hour. Therefore, if the report covers several hours (for example, the yesterday or today report) but the column only indicates a small number of outages, then the trunk member may be providing intermittent service. You should use the Facility Test Calls feature to determine whether a specific trunk member is functioning.</li> <li>2. If a trunk is just suspected of causing problems, you should use the ACA feature to monitor the particular trunk group.</li> <li>3. If a trunk member is totally out of service, then (depending on local arrangements) you may choose to refer the problem to maintenance personnel.</li> </ol>

## Trunk Group Status Report

---

The Trunk Group Status Report gives a current indication of the load on various trunk groups in terms of the number of calls waiting to be serviced.

For each trunk group, the Status Report displays the number of calls in the queue waiting to be serviced. For comparative analysis, the trunk members in the group that are active on calls are also displayed. With this data, it is possible to rearrange the members in the groups to provide load balancing. For example, if one group shows a higher number of calls waiting in the queue and the size of the group is too small, more members can be added to that group.

### Command

---

To display the Trunk Group Status Report, enter:

**monitor traffic trunk-groups [option]**

**Options:** Typing the command without an option will produce a display of the first 60 administered trunk groups. To display higher numbered trunk groups, type the number of the first group of the 60 trunk groups to be displayed. Only those trunk groups that are administered are shown on the report.

Because the command is constantly updated, you must press the cancel key to cancel the command.

### Screen

---

[Screen 3-48](#) shows a typical Trunk Group Status Report. If the system has less than 60 groups administered, then some of the right-hand columns will be blanks. The date and time at which the report was requested are displayed to the right of the screen title. [Table 3-41](#) describes the data fields presented in the Trunk Group Status Report.

The data on the screen is updated every minute. If the values of any of the fields for the given trunk group are changed, all the fields for that trunk group are updated.

```
monitor traffic trunk-groups
```

```

          TRUNK GROUP STATUS      19:03 SAT MAY 19 19xx
#   S   A   Q   W   #   S   A   Q   W   #   S   A   Q   W   #   S   A   Q   W
1  20  10   0   0   16  14   3   0   0   59   9   1   0   0
2  21  21  20  10   23   4   6   8   0   60   8   1  18   0
3  31  12   0   0   25   5   0   0   0   61   2   0   0   0
4  10   5  10   8   27  12   2  18   0   62   4   1   8   0
5   9   5  10   0   30   7   2  14   0   63   6   1  15   0
6  10   8  10   0   41   5   1   0   0   73   6   0   8   0
7   4   1   8   0   42  12   4  20   0  211  22   2   0   0
8   4   4   8   2   43   6   3   0   0
9   5   2  10   0   44  16   6  18   0
10  7   3  14   0   45   8   0   0   0
11  6   2  12   0   46   8   3  18   0
12  5   2  10   0   54   9   2   0   0
13  4   1   0   0   55   6   6  12   3
14  5   4   8   0   57   8   4  10   0
15  5   3   9   0   58   4   1   0   0
( #: Group; S: Grp Size; A: Active Members; Q: Q length; W: Call Waiting.)
    
```

### Screen 3-48. Trunk Group Status Report

**Table 3-41. Trunk Group Status Report**

Field	Description
#	<i>Group Number.</i> A number that identifies each trunk group.
S	<i>Group Size.</i> The number of trunks that are administered for the trunk group.
A	<i>Active Group Members.</i> The number of trunk members in the group that are active on a call. Busied-out trunks are not active.
Q	<i>Queue Length.</i> The length of the queue administered for the group.
W	<i>Waiting Calls.</i> The number of calls waiting in the group queue.

### Data Analysis Guidelines

The following guidelines are intended to show an easy and fast method of determining whether the collected data is invalid or questionable. These guidelines represent the least that you should do for validation. You should perform additional validation as necessary.

You can use the list performance trunk-group report to obtain an overall indication of those trunk groups that may be providing poor service. The five trunk groups with the highest percentage of blocking are listed in the list performance summary report. However, this report (summary) has the following limitations:

- The Group Blocking shown on this report is the percentage of blocking for outgoing and two-way trunk groups. For incoming trunk groups, the Group Blocking value is the percentage of all trunks busy (ATB). A high value for either % ATB or the % Out Blocking is an indication of possible traffic load problems.
- A two-way trunk group with undesirable incoming blocking will not show any problems on this report, since only outgoing blocking is displayed on two-way trunks.

You can use data from the Trunk Group Measurements Report for a more accurate estimate of service levels on incoming and two-way trunk groups. To validate the Trunk Group Measurements Report, verify that the following data is in order:

- Total Usage in CCS should not exceed 36 times group size. For example, with two trunks, the total usage measured should not exceed  $2 \times 36 = 72$  CCS.
- On incoming trunks, total seizures should be equal to total incoming seizures.
- Incoming trunk groups should have a queue length of zero.
- The number of incoming calls should never be greater than the total number of calls carried by all trunks in the group.
- Outgoing trunk groups should indicate zero as their number of incoming calls.
- Out-of-service trunks should never be greater than group size.
- For trunk groups that have a queue, the two fields (Calls Queued and Queue Overflow) should total the number displayed in the Group Overflow field.
- For trunk groups with queues, the Queue Overflow field is incremented whenever a call finds the all trunks busy condition and the queue is full.
- For trunks groups without queues, the Calls Queued and Queue Overflow fields are always zero. The blocked call count is reflected in the Group Overflow field.
- If the Percent Outgoing Blocking field shows a value greater than zero, the Queue Overflow (if a queue is administered for the trunk group), Queue Abandon, and Group Overflow fields should also have values greater than zero.

- Measurement hour data reported in the System Status Report (for example, monitor system view1 or monitor system view2) should correspond to those shown on the hourly trunk group measurements and performance reports.

## Analyzing the Data

---

The Trunk Group Summary Report may be used to determine:

- Average Holding Time
- Trunk Blockage
- Number of trunks required for a specified Grade of Service

### NOTE:

It should be realized that data collected in a real-time environment will virtually always deviate from the theoretically predicted data because of the asynchronous nature of processes and interactions with other events such as maintenance.

## Determining Average Holding Time

You can determine the Average Holding Time (in seconds) of a trunk group by dividing the Total Usage CCS by Calls Answered and multiplying the result by 100. A short holding time could indicate trouble.

### Example:

Assume the following data is reported for a one-way trunk group:

- Total Usage CCS = 656 CCS
- Total Seizures = 280

You can determine the Average Holding Time as follows:

$$\text{Average Holding Time} = \left[ \frac{\text{Total Usage CCS}}{\text{Total Seizures}} \right] \times \frac{100 \text{ Seconds}}{\text{CCS}}$$

$$\text{Average Holding Time} = \left[ \frac{656 \text{ CCS}}{280} \right] \times \frac{100 \text{ Seconds}}{\text{CCS}}$$

$$\text{Average Holding Time} = 234 \text{ seconds (or 3 minutes and 54 seconds)}$$

## Determining Trunk Group Blockage

Generally, you should use either the list measurements trunk-group summary or list performance trunk-group report for determining trunk group blockage. All of the appropriate calculations are performed by the system and the results are displayed via the reports. However, to be complete, the equations and an example are included.

To determine the Percent Blocking for one-way outgoing and two-way trunk groups, respectively, use the following equations:

One-Way Trunk Group (outgoing)

$$\text{Percent Out Blocking} = \left[ \frac{\text{Group Overflow}}{\text{Total Seizures} + \text{Group Overflow}} \right] \times 100 \%$$

Two-Way Trunk Group

*Percent Out Blocking* =

$$\left[ \frac{\text{Group Overflow}}{\text{Total Seizures} - \text{Incoming Seizures} + \text{Group Overflow}} \right] \times 100 \%$$

### ⇒ NOTE:

If the trunk group has a queue, group overflow is calculated as follows:

$$\text{Group Overflow} = \text{Queue Overflow} + \text{Queue Abandons}$$

### Example:

With the following data, determine the Percent Blocking of a two-way CO trunk group without a queue:

- Total Seizures = 280
- Incoming Seizures = 170
- Group Overflow = 6

Using the equation for two-way trunk groups, you can calculate average Percent Blocking as follows:

$$\text{Percent Blocking} = \left[ \frac{6}{(280 - 170) + 6} \right] \times 100 = 5.2 \%$$

## Determining the Number of Trunks Required for a Specified Grade of Service

For both stand-alone and last-choice trunk groups, you can use the trunk group peak traffic reports to determine the number of trunks that are required to provide a specified Grade of Service. The number of trunks required strictly depends on the Grade of Service that you want to provide.

### NOTE:

Stand-alone and last-choice trunk groups do not reroute their blocked calls. As a contrast, Alternate Routing trunks do reroute their blocked calls.

The procedure for determining the optimal number of trunk members for a particular trunk group requires that you initially generate the appropriate reports and subsequently record the data on the Trunk Group Data Worksheets. What you are attempting to accomplish is to identify the peak hour and the traffic data for that hour. The **list measurements trunk-group summary yesterday-peak scheduled** command will result in generating all of the necessary data on a daily basis. You can enter 20 weekdays of data on each Trunk Group Data Worksheet. Subsequently, you need only scan the worksheet in order to identify which measurement hour occurs most frequently. The most frequent is considered the peak hour. You should use the data for the identified peak hour, that has the highest total usage, to calculate the required number of trunks.

### Example 1:

#### Assumptions

1. You have been obtaining data (daily) and recording that data on appropriately identified Trunk Group Data Worksheets.
2. 1300 is the peak hour (or, bouncing peak hour).
3. Trunk Group 1 is suspected of not providing the desired Grade of Service.

For two-way trunk groups the equation for determining Calls Carried is as follows:

$$Calls\ Carried = Total\ Seize$$

$$Calls\ Carried = 280$$

For Trunk Groups Without a Queue

$$Total\ Calls\ Offered = Calls\ Carried + Group\ Overflow$$

For Trunk Groups With a Queue

$$Total\ Calls\ Offered =$$

$$Calls\ Carried + Queue\ Overflow + Queue\ Abandoned$$

Since Trunk Group 1 has a queue, the equation for Calls Offered is as follows:

$$\text{Total Calls Offered} = \text{Calls Carried} + \text{Queue Overflow}$$

$$\text{Total Calls Offered} = 280 + 50 + 1$$

$$\text{Total Calls Offered} = 331$$

The Average Holding Time is determined as follows:

$$\text{Average Holding Time (in seconds)} = \left[ \frac{\text{Total Usage (in CCS)}}{\text{Total Seizures}} \right] \times \frac{100 \text{ seconds}}{\text{CCS}}$$

$$\text{Average Holding Time (in seconds)} = \left[ \frac{656 \text{ CCS}}{280 \text{ seizures}} \right] \times \frac{100 \text{ seconds}}{\text{CCS}}$$

$$\text{Average Holding Time (in seconds)} = 234.29 \text{ seconds}$$

Offered Load is defined as the number of calls that would have been in progress if there had been no blocking or delay. The Offered Load can be calculated as follows:

$$\text{Offered Load} = \text{Average Holding Time (in seconds)} \times \text{Calls Offered}$$

$$\text{Offered Load (in CCS)} = \frac{234.29 \text{ (in seconds)} \times 331 \text{ calls}}{100 \text{ seconds per CCS}}$$

$$\text{Offered Load (in CCS)} = 775.5$$

The calculated Offered Load is used with the Retrial Capacity tables, to determine the number of trunks that are required to provide a specified Grade of Service. See *Basic Traffic Analysis*, for more information.

The desired Grade of Service is dependent on the particular trunk type (e.g., CO, did, tie, FX, WATS, etc.) and the nature of the business that the trunk type supports. Generally, those trunk types that are least expensive (for example, CO) will be engineered for a 1 percent (P.01) Grade of Service. Those trunk types that are more expensive are engineered to provide from 2 percent to 5 percent (P.02 to P.05) Grade of Service.

**⇒ NOTE:**

A one percent Grade of Service means that the fraction of calls blocked during the identified bouncing peak hour should not exceed 1 percent.

Assuming that we desire a P.01 Grade of Service on Trunk Group 1, for the calculated Offered Load of 775.5 CCS, the Retrial Capacity tables in *Basic Traffic Analysis* indicate (under the column heading GROUP SIZE) that 32 trunks are required.

The number of currently functioning (or in service) trunks is calculated as follows:

$$\# \text{ of In-Service Trunks} = \text{Trunk Group Size} - \text{Out of Service Trunks}$$

$$\# \text{ of In-Service Trunks} = 23 - 0$$

$$\# \text{ of In-Service Trunks} = 23$$

Therefore, since 32 trunks are required but only 23 are currently in service, nine additional trunks must be added to obtain the desired Grade of Service.

### Example 2:

#### Assumptions

1. You have been obtaining data (daily) and recording that data on appropriately identified Trunk Group Data Worksheets.
2. 1300 is the peak hour (or, bouncing peak hour).
3. Data on trunk group 4 indicates a higher than desired percentage of outgoing blockage.

For one-way outgoing trunk groups, the equation for determining Calls Carried is as follows:

$$\text{Calls Carried} = \text{Total Seize}$$

$$\text{Calls Carried} = 81$$

Since Trunk Group 4 does not have a queue, the equation for Calls Offered is as follows:

$$\text{Calls Offered} = \text{Calls Carried} + \text{Group Overflow}$$

$$\text{Calls Offered} = 81 + 5$$

$$\text{Calls Offered} = 86$$

The Average Holding Time is determined as follows:

$$\text{Average Holding Time (in seconds)} = \left[ \frac{\text{Total Usage (in CCS)}}{\text{Total Calls}} \right] \times \frac{100 \text{ seconds}}{\text{CCS}}$$

$$\text{Average Holding Time (in seconds)} = \left[ \frac{73 \text{ CCS}}{81 \text{ calls}} \right] \times \frac{100 \text{ seconds}}{\text{CCS}}$$

$$\text{Average Holding Time (in seconds)} = 90.12 \text{ seconds}$$

Offered Load is defined as the number of calls that would have been in progress if there had been no blocking or delay. The Offered Load can be calculated as follows:

$$\text{Offered Load} = \text{Average Holding Time (in seconds)} \times \text{Calls Offered}$$

$$\text{Offered Load (in CCS)} = 90.12 \text{ (in seconds)} \times 86 \text{ calls}$$

$$\text{Offered Load (in CCS)} = 77.50 \text{ CCS or } 78 \text{ CCS}$$

The calculated Offered Load is used, with the Retrial Capacity tables, to determine the number of trunks that are required to provide a specified Grade of Service.

Assuming that we desire a P.03 Grade of Service on Trunk Group 4, then for the calculated Offered Load of 78 CCS the Retrial Capacity tables in *Basic Traffic Analysis* indicate (under the column heading GROUP SIZE) that six trunks are required. The number of currently functioning (or in-service) trunks is as follows:

$$\# \text{ of In-Service Trunks} = \text{Trunk Group Size} - \text{Out of Service Trunks}$$

$$\# \text{ of In-Service Trunks} = 5 - 1$$

$$\# \text{ of In-Service Trunks} = 4$$

Therefore, since six trunks are required but only four are currently in-service, two additional trunks are needed to obtain the desired Grade of Service. The obvious options are (a) have the out-of-service trunk repaired and just add one new trunk, or (b) add two new trunks.

### Example 3:

#### Assumptions

1. You have been obtaining data (daily) and recording that data on appropriately identified Trunk Group Data worksheets.
2. 1300 is the peak hour (or, bouncing peak hour).
3. That Trunk Group 2 indicates a higher % ATB than desired.

Incoming trunk groups do not have queues. Therefore, from the switch perspective you cannot determine the number of calls that are blocked. But, in this case Total Usage is actually the Carried CCS. You can use the Carried CCS with the Retrial Capacity tables, to determine the number of trunks that are required to provide a specified Grade of Service.

Assuming that you desire a P.05 Grade of Service on trunk group #2, then for a Carried CCS of 201 CCS the Retrial Capacity tables in the *DEFINITY Communications System and System 75 and System 85 Traffic Tables*, 555-104-503, indicates (under the column heading GROUP SIZE) that 10 trunks are required. The number of currently functioning (or in-service) trunks is as follows:

$$\# \text{ of In-Service Trunks} = \text{Trunk Group Size} - \text{Out of Service Trunks}$$

$$\# \text{ of In-Service Trunks} = 6 - 0$$

$$\# \text{ of In-Service Trunks} = 6$$

Therefore, since 10 trunks are required but only 6 are currently in-service, four additional trunks are needed to obtain the desired Grade-of-Service. The solution is to add four trunk members to the trunk group.

## Trunk Group Call-By-Call (CBC)

### Background Information

1. In a non Call-By-Call Service Selection environment, a trunk group must be preassigned and provisioned for each desired service (for example, MEGACOM telecommunications service, WATS, SDN, etc.). With this arrangement, each trunk group must be designed to accommodate the peak traffic load for the intended service application. Furthermore, the time when one service application encounters peak traffic may not coincide with when another service application encounters peak traffic. As an alternative, if multiple network services are accommodated with a single trunk group (which is referred to as a CBC Trunk Group), and that trunk group is provided with allocation and scheduling controls, then significant trunking efficiencies may be realized by distributing the total traffic for all of the specified network services over the total number of available trunk members.
2. By implementing Usage Allocation Plans (UAPs) you can optimize, within certain limits, the CBC trunk group without involving any of the Inter-Exchange Carrier/Local Exchange Carrier (IXC/LEC) network services personnel. Each Usage Allocation Plan specifies the network services/features that may be accommodated with the trunk group. It also specifies the minimum number of reserved channels and maximum number of channels that each service/feature may use at a given time.

3. The free pool concept is associated with UAP's. Specifically, free pool refers to the number of trunks that have not been reserved for a specific service/feature and are free to be assigned to another service or feature. The free pool is calculated as:

$$\text{Free Pool} = \text{Total \# of in-service Trunks} - \sum \text{of the Mins* (for each S/F)}$$

\* Minimum channel assignment.

4. Each Usage Allocation Plan may be administered as fixed or scheduled. With the fixed method, a specified plan remains in effect, continuously. With the scheduled method, two or three Usage Allocation Plans may be scheduled to vary by both day of week and time of day.
5. Before you can analyze the Trunk Group CBC Measurements Report, you must know the intent of the strategy for each Usage Allocation Plan. You should have (in hand) a completed copy of the CBC Trunk Group Usage Allocation Plan and the associated Assignment Schedule, which are Pages 3 and 4 of the Trunk Group Administration Form. Refer to your *Administration and Feature Description* manual, or to the *DEFINITY Communications System Generic 1 DS1/DMI/ISDN-PRI Reference*, for additional details.
6. For wideband calls that consume more than 64 kbps of bandwidth, the total usage consumed will be reflected in the Total Usage field. (For example, the usage for a 384-kbps call is six times more than for a 64-kbps call.) However, these calls will be counted only as a single call. The call counts that may be incremented due to wideband calls are: Total Seize, Incoming Seize, Overflow Trunk Group, Overflow Service/Feature, Overflow Maximum Service/Feature. The %ATB and %Out Blk fields are also affected by wideband calls.

## Trunk Group Call-By-Call Measurements Report

---

The Trunk Group Call-By-Call (CBC) Measurements Report displays last-hour traffic data for any specified cbc trunk group, provided that the trunk group had a Usage Allocation Plan (UAP) administered for the last-hour. You can use the report to monitor the trunk group and to determine if the UAP meets current needs. Whenever it is determined that changes are required, you must make these changes on the appropriate trunk group form(s). Note that if the trunk group is administered to support wideband switching, the tag "WIDEBAND Support" appears in the report title.

## Command

To display the Trunk Group CBC Measurements Report, enter:

**list measurements cbc-trunk-group <number> last-hour [print/schedule]**

Options: The print and schedule options are available for this command.

## Screen

[Screen 3-49](#) shows the Trunk Group Call-By-Call Measurements Report. The line just above the report title displays the date and time for which the report was requested. [Table 3-42](#) describes the data fields presented in the CBC Trunk Group Measurements Report.

```
list measurements cbc-trunk-group 99 last-hour
Switch Name:  Cust_Switch_Name           Date: 2:15 pm WED MAY 9, 19xx
              CBC TRUNK GROUP MEASUREMENTS (WIDEBAND Support)
              Peak Hour For CBC Trunk Group 99 : 1300
              Queue Size:40                Usage Allocation Plan Used
              Calls Queued:23              Plan Number:  1  0  0  0  0  0
              Queue Overflow: 0            Duration: 60  0  0  0  0  0
              Queue Abandonments: 4
              Out of Service: 0
Service/      Min Max Meas Total Total Inc.  Tan  OvF  OvF  OvF  %    %  %Out
Feature      Chn Chn Hour Usage Seize Seize Seize TG S/F Max TBM ATB BLK
outwats-bnd  5 12 1300  240  333  0   55  0  0  23  10  2  1
sdn          4  8 1300   40   30  22   1  0  0  0  62  1  0
other       0 20 1300   70   41  36   3  0  0  0  0  0  0
Command successfully completed
Command:
```

### Screen 3-49. Trunk Group Call-By-Call Measurements Report

**Table 3-42. Trunk Group Call-By-Call Measurements Report**

Field	Description
Queue Size	<p>Size of the queue for the ISDN-PRI CBC trunk group. If zero is displayed, then no queue is administered. Hence, the other queue measurements will also be zero. If the queue is administered, then it serves all of the network services/features that are administered for the trunk group. However, its functional operation is somewhat different than the queue used with conventional trunk groups. When a particular service/feature uses its allotted maximum number of channels, then any additional call attempts will be queued, even though not all of the trunks are currently being used. If the queue is already full, any additional call attempts will simply overflow with the caller receiving reorder tone.</p> <p><b>Recommendations:</b> Since one service/feature generally will not experience peak traffic the same time as another service/feature, there will be an averaging effect. Furthermore, the queue size for a CBC trunk group need not be much larger than for a non CBC trunk group. The Queue Size should be larger than the trunk group size; but, typically, not more than three times as large as the trunk group size.</p>
Calls Queued	<p>The total number of calls that entered the CBC trunk group queue during the hour.</p>
Queue Overflow	<p>The total number of calls that were denied access to a trunk, found the queue full, and the caller received reorder tone.</p> <p><b>Suggested Actions:</b> Generally, this field will indicate the number 0. If this field indicates a high number, then:</p> <ol style="list-style-type: none"> <li>1. The queue size may be too small, or</li> <li>2. More trunks may be needed so that fewer calls will queue, or</li> <li>3. The UAP may be too restrictive (for example, some of the "Min Chn" values may be too high, or some of the "Max Chn" values may be too low). Also, see Suggested Actions in the % TBM description.</li> </ol>

*Continued on next page*

**Table 3-42. Trunk Group Call-By-Call Measurements Report — Continued**

Field	Description
Queue Abandon-ments	<p>The number of calls that were removed from the queue by either the system or the user. The system automatically removes calls from the queue after 30 minutes. A user may abandon his/her call by canceling the Automatic Callback feature (that was set earlier to place their call in the queue).</p> <p><b>Suggested Action:</b> Recall that a trunk group and its associated queues are sized to accommodate peak-hour traffic loads. Typically, this field will indicate a small number. However, a large number will generally indicate that the queue size is too large and that people are abandoning because they have remained in queue for a long time. Consider adding more trunks so that fewer calls will queue.</p>
Out of Service	<p>The number of trunks in the trunk group that are out of service at the time the measurements are collected. An individual trunk may be taken out of service, (a) automatically by the switch whenever an excessive number of errors occur, or (b) by maintenance personnel in order to run diagnostic tests.</p> <p><b>Suggested Action:</b> If the trunks were removed from service by the switch, then the appropriate maintenance personnel should be notified. The objective is to keep all members of a trunk group in service. Generally, you should not make adjustments to the CBC trunk group because of Out of Service trunks, but should get those trunks returned to service.</p>
Usage Allocation Plan Used	<p>A list of the Usage Allocation Plan numbers followed by a list of the durations (in minutes) that each plan was in effect during the measurement interval. The Number field can display up to a maximum of six plan numbers. A maximum of three different usage allocation plans (that are identified by the numbers 1, 2, and 3) may be defined for each trunk group. All three plans are defined on Page 3 of the trunk group form. Page 4 of the corresponding trunk group form is where you administer plan assignments.</p>
Usage Allocation Plan Used (Contd)	<p>Each CBC trunk group is administered with either "fixed" allocation or "scheduled" allocation. When administered as fixed, it remains in effect continuously. Whenever it is administered as scheduled, the designated plans are activated on a per-day and time-of-day basis that is determined by the schedule.</p>

*Continued on next page*

**Table 3-42. Trunk Group Call-By-Call Measurements Report — Continued**

Field	Description
Service Feature	The names of up to ten services/features and the special identifier "other" for which the associated measurements are being reported.
Min Chn	<i>Minimum number of channels.</i> The minimum number of channels in the ISDN-PRI CBC trunk group allocated to the specified service/feature at the time the measurements were collected.
Max Chn	<i>Maximum number of channels.</i> The maximum number of channels in the ISDN-PRI CBC trunk group allocated to the specified service or feature at the time the measurements were collected.
Total Usage	The sum of time, in hundred-call-seconds (CCS), for all channels that were used by the specified service/feature during the measurement interval.
Total Seize	<i>Total Seizures.</i> The total number of incoming and outgoing calls that requested the specified service/feature through the ISDN-PRI CBC trunk group.
Inc. Seize	<p data-bbox="335 919 1072 1041"><i>Incoming Seizures.</i> The total number of incoming calls that requested the specified service/feature through the ISDN-PRI CBC trunk group. For two-way and outgoing trunks, the number of <i>Outgoing Seizures</i> can be calculated as follows:</p> $Out\ Seize = Total\ Seize - In\ Seize$
Tan Seize	<i>Tandem Seizures.</i> The total number of trunk-to-trunk call seizures using this Service/Feature.

**Continued on next page**

**Table 3-42. Trunk Group Call-By-Call Measurements Report — Continued**

Field	Description
Ovf TG	<p><i>Overflow trunk group.</i> The number of outgoing calls that requested the specified service/feature, on the ISDN-PRI CBC trunk group, but were not carried because the calls arrived to find that no idle trunk members were available.</p> <p> <b>NOTE:</b>                      There are three overflow fields, each of a different priority. They are: overflow trunk group (Ovf TG) (priority 1), overflow maximum (Ovf Max) (priority 2), and overflow services/features (Ovf S/F) (priority 3). If more than one of the overflow conditions is met, only the field that represents the condition with the highest priority is incremented.</p>
Ovf S/F	<p><i>Overflow services/features.</i> The number of calls that requested the specified service/feature but were denied because the calls arrived under the following conditions:</p> <ul style="list-style-type: none"> <li>■ The specified service/feature was at or above its minimum channel allocation and below its maximum allocation.</li> <li>■ There were idle channels available in the trunk group, but they had been reserved to meet the minimum channel allocation for other services/features.</li> </ul> <p><b>Suggested Actions:</b></p> <ol style="list-style-type: none"> <li>1. Investigate the possibility of raising the "Min Chn" requirements for this service/feature.</li> <li>2. Investigate the possibility of increasing the number of members for the trunk group.</li> <li>3. Determine whether or not the "Min Chn" assignments for the other services/features are appropriate. For example, if the column "% TBM" displays a high number for one or more of the other service/features, then you can lower the minimums (for one or more of the other services/features). This will make available more trunks for this service/feature.</li> </ol>

*Continued on next page*

**Table 3-42. Trunk Group Call-By-Call Measurements Report — Continued**

Field	Description
Ovf Max	<p><i>Overflow maximum.</i> The number of calls that were not carried because the calls originated at a time when the service/feature had already used-up its allotted maximum number of channels. In this case, the trunk group may still have trunk members available for the other services/features.</p> <p><b>Suggested Actions:</b></p> <ol style="list-style-type: none"> <li>Investigate the possibility of raising the number that is administered in the Max Chn field. This is only possible provided that the free pool is not exceeded. To determine whether or not you have more trunks available for a S/F calculate the following:                     <math display="block">\text{Max} - \text{Min (for the identified S/F)} \leq \text{Free Pool}</math> <p>For example, use the above equations with the data in the formula as follows:</p> <math display="block">\text{Free Pool} = \text{Total \# of in-service trunks} - \sum \text{Min for each S/F}</math> <math display="block">\text{Free Pool} = 18 - (5+4)</math> <math display="block">\text{Free Pool} = 9</math> <math display="block">8 - 4 \text{ (for SDN)} \leq 9</math> <math display="block">4 \leq 9 \text{ Therefore, you can increase the Max}</math> </li> <li>Consider adding more trunks to the trunk group and increase the maximum for the identified service/feature.</li> </ol>
% TBM	<p><i>Percentage of trunks below minimum.</i> The percentage of time during the polling interval that the number of channels in use by the specified service/feature is below the specified minimum.</p> <p><b>Suggested Action:</b> Lower the "Min Chn" since this may be the cause for the "Ovf S/F".</p> <p><b>NOTE:</b>   If the field (% TBM" is high, then you are reserving more trunk members than will be used. Determine if another service/feature needs more trunks and, if so, lower the "Min Chn" for this service/feature.</p>

*Continued on next page*

**Table 3-42. Trunk Group Call-By-Call Measurements Report — Continued**

Field	Description
% ATB	<p data-bbox="335 292 1071 417"><i>Percentage All Trunks Busy (ATB)</i>. The percentage of time (0 to 100%) during the measurement interval that the specified service/feature could not get a channel because of at least one of the following reasons:</p> <ul style="list-style-type: none"> <li data-bbox="347 437 1071 498">■ All trunks in the ISDN-PRI CBC trunk group were busy on a call or busied-out by maintenance.</li> <li data-bbox="347 517 1071 611">■ This service/feature was above its minimum; and all available trunks were reserved for other features/services that were below their minimums.</li> <li data-bbox="347 630 1071 691">■ The specified feature or service was at its maximum number of channels.</li> </ul>
% ATB (Contd)	<ol style="list-style-type: none"> <li data-bbox="347 707 1071 865">1. A number in the Ovf TG field indicates that the physical maximum number of trunks has been exhausted. Unless the trunk group is the last preference in the routing pattern, overflow is to the next trunk group. Otherwise, the obvious choice is to add more trunks to the trunk group.</li> <li data-bbox="347 885 1071 978">2. If the Ovf S/F field indicates a problem (for example, a significant number), refer to <b>Suggested Actions</b> in the Ovf S/F description.</li> <li data-bbox="347 998 1071 1091">3. If the Ovf Max field indicates a problem (a significant number), refer to <b>Suggested Actions</b> in the Ovf Max description.</li> </ol> <p data-bbox="335 1120 1071 1252">  <b>NOTE:</b>                      If the ISDN-PRI CBC trunk group has been administered to support wideband switching, the title WIDEBAND Support will appear in the report title.                 </p>

*Continued on next page*

**Table 3-42. Trunk Group Call-By-Call Measurements Report — Continued**

Field	Description
% BLK	<p><i>Percentage outgoing blocking.</i> The ratio of outgoing calls not carried for a specified service/feature to the outgoing calls offered by the service/feature. For an ISDN-PRI CBC trunk group with no queue, the calls not carried are those calls that find all facilities busy for the specified service/feature. For an ISDN-PRI CBC trunk group that has a queue, the calls not carried are queue abandons plus those calls that find all facilities for the specified service/feature busy and cannot be queued because the queue is full.</p> <p><b>Suggested Actions:</b></p> <ol style="list-style-type: none"><li>1. Look at the % ATB column and identify any service/feature that has a high value. Follow the <b>Suggested Actions</b> in the % ATB description.</li><li>2. You can increase the length of the queue rather than adding more trunks. Subsequently, you should monitor the Queue Abandonments field to insure that it stays within reasonable limits.</li><li>3. If conditions are such that Item 1 above is not appropriate, then you may find it necessary to add more trunks.</li></ol>

## Trunk Lightly Used Measurements Report

The Trunk Lightly Used Measurements Report lists the five trunk members with the lowest number of calls carried for each trunk group. The trunk lightly used data is kept for the current day, the previous day, and the last hour.

### Command

To display the Trunk Lightly Used Measurements Report, enter:

```
list measurements lightly-used-trunk [option] [print/schedule]
```

**Options:** Options are **yesterday** for a report of yesterday's trunk activity, **today** for a report of today's trunk activity, or **last-hour** for a report of the trunk activity of the most recently completed hour.

## Screen

---

[Screen 3-50](#) shows a typical screen for the Trunk Lightly Used Measurements Report. The time and date that the report was requested is displayed at the top right. [Table 3-43](#) lists and describes the data fields in the Trunk Lightly Used Measurements Report.

```
list measurements lightly-used-trunk yesterday
Switch: Cust_Switch_Name          Date: 4:03 pm SAT MAY 19, 19xx
                                TRUNK LIGHTLY USED REPORT
(five trunks with lowest number of calls carried W = Wideband Support)
Grp   Grp   Grp   Grp   Grp   Calls
No.   Type  Dir   Size  Mbr#  Carried
1     co    two   5     3     0
1     co    two   5     4     3
2     isdn  two   5     3     7     W
2     isdn  two   5     4     8     W
2     isdn  two   5     5    10     W
4     wats  out  10    2     6
4     wats  out  10    6     6
4     wats  out  10    9     7
4     wats  out  10    4    12
4     wats  out  10   10    13
Command successfully completed
Command:
```

### Screen 3-50. Trunks Lightly Used Report

**Table 3-43. Trunk Lightly Used Measurements Report**

Field	Description
Grp No.	<i>Group Number.</i> A number that identifies the trunk group associated with the displayed data.
Grp Type	<p><i>Group Type.</i> The type of trunk associated with the accumulated data. The system monitors the following trunk types (see <i>DEFINITY Enterprise Communications Server Release 5 Administration and Feature Description</i>):</p> <ul style="list-style-type: none"> <li>■ Access (acc)</li> <li>■ Advanced Private Line Termination (aplt)</li> <li>■ Central Office (co) or Public Network Service</li> <li>■ Customer Provided Equipment (cpe)</li> <li>■ Direct Inward Dialing (did)</li> <li>■ Direct Inward/Outward Dialing (diod)</li> <li>■ Foreign Exchange (fx)</li> <li>■ Integrated Services Digital Network (isdn-pri)</li> <li>■ Release Link Trunk (rlt)</li> <li>■ Tandem (tan)</li> <li>■ Tie Trunk (tie)</li> <li>■ Wide Area Telecommunications Service (wats)</li> </ul>
Grp Dir	<i>Group Direction.</i> Identifies whether the trunk group is incoming (inc), outgoing (out), or two-way (two).
Grp Size	<i>Group Size.</i> The number of administered trunks in a specified trunk group. Refer to the <i>DEFINITY Enterprise Communications Server Release 5 System Description Pocket Reference</i> , for additional details.

**Continued on next page**

**Table 3-43. Trunk Lightly Used Measurements Report — Continued**

<b>Field</b>	<b>Description</b>
Grp Mbr#	<i>Group Member Number.</i> The number that identifies a specific trunk member (in the group number).
Calls Carried	The number of calls carried on the trunk member over the report interval (yesterday, today, or last hour). Wideband calls increment this counter once for every trunk or 64-kbps channel that they use.  <b>Suggested Action:</b> <ol style="list-style-type: none"><li>1. If the identified trunk member has zero or a very small number of calls (seizures) in comparison to other listed trunk members, then you should use the Facility Test Calls feature to determine whether a specific trunk member is functioning.</li><li>2. If a trunk is just suspected of causing problems, you should use the ACA feature to monitor the particular trunk group.</li></ol>
Wideband Flag	If any trunks in the trunk group were used in a wideband (n X DS0) connection, a "W" appears next to the trunk entry. In addition, the tag "W = Wideband Support" appears in the report heading.

## **Wideband Trunk Groups**

This section describes the traffic reports and selection screen for wideband trunk groups. It also provides guidelines for validating and analyzing the wideband trunk group data.

## Wideband Trunk Group Summary Report

The Wideband Trunk Group Summary Report gives traffic measurements for all trunk groups administered to support wideband switching. By using this report, you can determine the trunk group total wideband usage (in CCS), the total number of wideband calls, the percentage of wideband calls that were blocked, and other measurement data.

### Command

To display the Wideband Trunk Group Summary report, enter:

**list measurements wideband-trunk-group summary [option]  
 [print/schedule]**

**Options:** Options are **yesterday-peak** for a report of yesterday's peak wideband call activity, **today-peak** for a report of today's peak wideband call activity, or **last-hour** for a report of the wideband call activity of the most recently completed hour. A peak hour is the hour within a 24-hour period that had the greatest usage.

### Screen

[Screen 3-51](#) shows a typical screen for the Wideband Trunk Group Summary Report. [Table 3-44](#) describes the data fields presented in the Wideband Trunk Group Summary Report.

```
list measurements wideband-trunk-group summary last-hour
Switch Name: Cust_Switch_Name           Date: 1:58 pm MON SEP 16, 19xx
                WIDEBAND TRUNK GROUP SUMMARY REPORT
                Peak Hour For Wideband Usage For All Trunk Groups: 1000
Grp Grp  Grp Service Meas Total Total Inc. Grp Out  %  %Out
No. Size Dir Type  Hour Usage Seize Seize Ovfl Srv  ATB Blk
37  22  two access  1200 598  5  0  0  0  0  0  0
38  23  two cbc     1200 171  2  0  0  0  0  0  0
39  22  two sdn     1200 270  3  0  0  0  0  0  0
```

Screen 3-51. Wideband Trunk Summary Report

**Table 3-44. Wideband Trunk Group Summary Report**

Field	Description
Peak Hour for Wideband Usage for All Trunk Groups	The hour during the specified day that has the highest total wideband call usage, when summed over all trunk groups. Peak hour and busy hour are synonymous. With conventional traffic theory data analysis, there are two methods for determining the peak hour. One is the time-consistent peak hour, meaning that hourly usage values are averaged across days for each hour of the day. The other is the bouncing peak hour, meaning that the highest usage is selected for each day without regard to the average across days. For the bouncing peak hour the highest load on a given day may or may not occur during the time-consistent busy hour. These traffic reports and accompanying trunk group data worksheet only use the bouncing peak hour method. Note that if the total usage for the current hour equals the total usage for the previous peak hour, then the peak hour is the hour with the greatest number of total seizures.
Grp No.	<i>Group Number.</i> A number that identifies each trunk group associated with the displayed data. Group numbers are displayed in numerical order, beginning with the lowest administered number and continuing to the highest administered number.
Grp Size	<i>Group Size.</i> The number of administered trunks in the trunk group.
Grp Dir	<i>Trunk Group Direction.</i> Identifies whether the trunk group is incoming ( <i>inc</i> ), outgoing ( <i>out</i> ), or two-way ( <i>two</i> ).
Service Type	<i>Service Type.</i> The administered Service Type for the trunk group. Valid entries are <i>accunet</i> , <i>i800</i> , <i>inwats</i> , <i>lds</i> , <i>mega800</i> , <i>megacom</i> , <i>multiquest</i> , <i>operator</i> , <i>other</i> , <i>outwats-bnd</i> , <i>public-ntwrk</i> , <i>sdn</i> , <i>sub-operator</i> , and <i>wats-max-bnd</i> .
Meas Hour	<i>Measurement Hour.</i> The hour (using 24-hour clock) in which the measurements are taken. For the <b>last-hour</b> report, it is the last hour of measurement (each trunk group's measurement hour is identical; but not necessarily the same as the indicated peak hour for the day). For the <b>today-peak</b> report, the measurement hour is the peak hour for each trunk group thus far today (each trunk group's measurement hour could be different). For the <b>yesterday-peak</b> report, the measurement hour is the peak hour for each trunk group yesterday (each trunk group's measurement hour could be different).

*Continued on next page*

**Table 3-44. Wideband Trunk Group Summary Report — Continued**

Field	Description
Total Seize	<i>Total Seizures.</i> The number of wideband call attempts. This measurement includes completed calls, false starts, don't answers, and busies.
Inc. Seize	<p><i>Incoming Seizures.</i> The number of wideband incoming call attempts. This measurement includes completed calls, false starts, don't answers, and busies. The number of Outgoing Seizures can be calculated as follows:</p> $Out\ Seize = Total\ Seize - Inc\ Seize$
Total Usage	Total wideband call usage (in CCS) for all trunks in the trunk group. Represents the total time the trunks are busy processing wideband calls.
Grp Ovfl	<p><i>Group Overflow.</i> The number of outgoing wideband calls that were attempted when the remaining trunk group capacity was insufficient to accommodate the call or the trunk group's remaining bandwidth was in the wrong configuration. This measurement does not include unauthorized calls that are denied service on the trunk group (due to restrictions).</p> <p>The number of wideband calls equals the number of actual calls, regardless of the number of trunks involved in the call.</p>
Out Serv	<p><i>Out of Service.</i> The number of trunks in the trunk group that are out of service (listed as maintenance busy) at the time the data is collected.</p> <p><b>Suggested Action:</b> If the trunks were removed from service by the switch, then the appropriate maintenance personnel should be notified. The objective is to keep all members of a trunk group "in service." Generally, you should not make adjustments to the trunk group because of "Out of Service" trunks, but should get those trunks returned to service. Refer to the <a href="#">"Trunk Outage Measurements Report"</a> for specific details.</p>

**Continued on next page**

**Table 3-44. Wideband Trunk Group Summary Report — Continued**

Field	Description
% ATB	<p data-bbox="350 288 1087 383"><i>Percentage all trunks busy.</i> The percentage of time that all trunks in the trunk group were simultaneously in use during the measurement interval.</p> <p data-bbox="350 413 1087 508"><b>⇒ NOTE:</b>                      In use means that the trunks were busy — either serving calls, or because they were busied-out by maintenance.</p> <p data-bbox="350 544 1087 575"><b>Suggested Actions:</b></p> <ol data-bbox="366 593 1087 1121" style="list-style-type: none"> <li data-bbox="366 593 1087 942">1. If the group direction is outgoing or two-way, then a high number in the % ATB field and nothing in the Grp Ovf1 would indicate that everything is functioning normally. However, a more typical scenario would be a high number in this field and also a high number in the Grp Ovf1 field. This would indicate a possible problem that necessitates further analysis. Unless this trunk group is the last preference in the pattern, overflow is to the next choice trunk group, and the number in the Grp Ovf1 field is of no great significance. Otherwise, the obvious choice is to add more trunks to the trunk group.</li> <li data-bbox="366 960 1087 1121">2. If the group direction is incoming, then a high number in this field is bad. It indicates that some incoming calls are probably being blocked. Generally, you will want to add more trunks, thus lowering the % ATB and decreasing the number of calls that are being blocked.</li> </ol>

**Continued on next page**

**Table 3-44. Wideband Trunk Group Summary Report — Continued**

Field	Description
% Out Blk	<p><i>Percentage Outgoing Blocking.</i> The percentage of offered wideband calls that are not carried on the trunk group. It does not include unauthorized wideband calls that are denied service on the trunk group (due to restrictions) or calls that are carried on the trunk group but do not successfully complete at the far end (that is, where there is no answer). The calls not carried are calls that are made when the remaining trunk group capacity is insufficient to serve them. The Percentage Outgoing Blocking is calculated as follows: The number of Outgoing Seizures is calculated as follows: <math>\text{Outgoing Seizures} = \text{Total Seizures} - \text{Incoming Seizures}</math> Similarly, the equation for calculating Outgoing Calls Offered is as follows:</p> $\text{Outgoing Calls Offered} = \text{Group Overflow} + \text{Outgoing Seizures}$ $\% \text{ OutBlk} = \left[ \frac{\text{Group Overflow}}{\text{Outgoing Calls Offered}} \right] \times 100$

## Wideband Trunk Group Hourly Report

For the trunk groups chosen at the Wideband Trunk Group Selection screen, the Wideband Trunk Group Hourly Report lists the wideband call activity for all hours of switch activity. This information helps you validate the information in the Wideband Trunk Group Summary Report.

### Command

To display the Trunk Group Hourly Report, enter:

```
list measurements wideband-trunk-group hourly <trunk group no.>
[print/schedule]
```

**Options:** The print and schedule options are available for this command.

## Screen

Screen 3-52 shows a typical screen for the Wideband Trunk Group Hourly Report. Table 3-45 and Table 3-46 describe the data fields presented in the Wideband Trunk Group Hourly Report. The report contains two sections: a header section that provides the report ending time and trunk group administrative information; and a data section that provides the measurement data for 24 hours.

```
list measurements wideband-trunk-group hourly 40
Switch Name: Cust_Switch_Name                               Date: 1:58 pm MON SEP 16, 19xx
                                WIDEBAND TRUNK GROUP HOURLY REPORT
Grp No: 40           Grp Size: 23   Grp Dir: two   Service Type: access
Meas Total  Maint  Total  Inc.  Tandem  Grp   Out   %   %Out
Hour Usage  Usage  Seize  Seize Seize  Ovfl  Serv ATB Blk
1200 262    0     3     0     0     6     0   6   15
1100 312    0     3     0     0     0     0   0   0
1000 169    0     1     0     0     4     0   3   5
900  26     0     0     0     0     0     0   0   0
800  1      1     4     0     0     0     0   0   0
```

### Screen 3-52. Wideband Trunk Group Hourly Report

**Table 3-45. Wideband Trunk Group Hourly Report (Header)**

Field	Description
Grp No:	<i>Group Number.</i> A number that identifies the trunk group associated with the displayed data.
Grp Size:	<i>Group Size.</i> Number of trunks in the trunk group.
Grp Dir:	<i>Group Direction.</i> Incoming (inc), outgoing (out), or two-way (two).
Service Type:	<i>Service Type.</i> The administered Service Type for the trunk group. Valid entries are accunet, i800, inwats, lds, mega800, megacom, multiquest, operator, other, outwats-bnd, public-ntwrk, sdn, sub-operator, and wats-max-bnd.

**Table 3-46. Wideband Trunk Group Hourly Report (Data)**

Field	Description
Total Usage	Total wideband call usage (in CCS) for all trunks in the trunk group. Represents the total time the trunks are busy processing wideband calls.
Maint Usage	<i>Maintenance Usage.</i> The total usage of trunks in this trunk group for Maintenance Busy or any other non-call situation where trunks are not available to carry a call.
Total Seize <sup>1</sup>	<i>Total Seizures.</i> The number of wideband call attempts. This measurement includes completed calls, false starts, don't answers, and busies.
Inc. Seize*	<p><i>Incoming Seizures.</i> The number of wideband incoming call attempts. This measurement includes completed calls, false starts, don't answers, and busies. The number of Outgoing Seizures can be calculated as follows:</p> $Out\ Seize = Total\ Seize - Inc\ Seize$ $Outgoing\ Calls\ Offered = Group\ Overflow + Outgoing\ Seizures$ $\% \ OutBlk = \left[ \frac{Group\ Overflow}{Outgoing\ Calls\ Offered} \right] \times 100$
Tandem Seize*	<i>Tandem Seizures.</i> The number of trunk-to-trunk wideband call seizures. This count is incremented on the outgoing-trunk side of the connection.
Grp Ovfl	<i>Group Overflow.</i> The number of outgoing wideband calls that were attempted when the remaining trunk group capacity was insufficient to accommodate the call or the trunk group's remaining bandwidth was in the wrong configuration. This measurement does not include unauthorized calls that are denied service on the trunk group (due to restrictions).

**Continued on next page**

**Table 3-46. Wideband Trunk Group Hourly Report (Data) — Continued**

Field	Description
Out Serv	<i>Out of Service.</i> The number of trunks in the trunk group that were out of service during the measurement hour.
% ATB	<i>Percent All Trunks Busy.</i> The percentage of time during the measurement interval that all trunks in the group are unavailable to carry a new call (All Trunks Busy).
%Out Blk	<i>Percent Outgoing Blocking.</i> The percent of the outgoing wideband call seizures, including tandem wideband call seizures, offered to that trunk group that are not carried on that trunk group. The value is calculated as follows:  $\% \text{ Out Blk} = \{ \text{Grp Ovfl} / [\text{Total Seize} - \text{Inc Seize} + \text{Grp Ovfl}] \} \times 100$

1. The number of logical calls equals the number of actual calls, regardless of the bandwidth.

## Wideband Trunk Group Measurement Selection Form

The Wideband Trunk Group Measurement Selection Form is used at administration time to specify trunk groups to list on the Wideband Trunk Group Hourly Reports. It permits the user to administer which trunk groups are to be reported for the hourly report. (Measurements on administered trunk groups are collected to list them on the wideband summary and hourly reports.) A maximum of 10 trunks can be studied on the Release 5si. On the Release 5r, the maximum is 30. If no selections are made, no trunk groups will be studied hourly.

### Command

To display the Wideband Trunk Group Measurement Selection Form, enter:

**change/display meas-selection wideband-trunk-group [print/schedule]**

**Options:** The print and schedule options are available for the display command only.

## Screen

[Screen 3-53](#) shows a typical screen for the Wideband Trunk Group Measurement Selection Form on the Release 5r. [Table 3-47](#) describes the data fields presented in the Wideband Trunk Group Measurement Selection Form.

```
display meas-selection wideband-trunk-group
WIDEBAND TRUNK GROUP MEASUREMENT SELECTION
Trunk Group Numbers
1: 78          7: 15          13: 96          19: 333         25: 580
2: 80          8: 16          14: 97          20: 444         26: 590
3: 666         9: 17          15: 98          21: 555         27: 591
4: 1           10: 18         16: 100         22: 101         28: 592
5: 2           11: 81         17: 120         23: 102         29: 10
6: 3           12: 82         18: 200         24: 103         30: 99
```

### Screen 3-53. Wideband Trunk Group Measurement Selection

**Table 3-47. Wideband Trunk Group Measurement Selection Form**

Field	Description
Trunk Group Numbers	Defines the trunk group(s) to be studied hourly for wideband activity.

## Data Analysis Guidelines

The wideband summary and hourly reports closely parallel the other trunk group summary and hourly reports. That is, visually they contain similar fields, except there is no queuing for wideband calls, so queuing fields are eliminated. Logically, the difference is that only the wideband reports isolate wideband call usage. If the trunk group processes ordinary narrowband calls during the measurement period, the narrowband measurements are *not* included in the wideband traffic measurements.

With the overall trunk group measurements and the wideband trunk group measurements, the customer has data for all usage and can calculate the narrowband call usage and counts by subtracting the wideband measurement from the overall measurements.

## Wideband Trunk Group Summary Report

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The Wideband Trunk Group Summary Report provides data essential for monitoring trunk groups supporting wideband service to assure that they are providing the expected level of service. The report is modeled after the Trunk Group Summary Report but only trunk groups administered to provide wideband service are reported. Other trunk groups do not appear on the report. If a trunk group is administered to provide wideband service but had no wideband traffic during the measurement period, then zeros are shown on the report.

The yesterday-peak and today-peak reports list the wideband call activity for the peak wideband traffic hour. That is, the measurements shown are those that occurred during the hour in which the Total Usage for wideband service for that trunk group was highest. This is not necessarily the same peak hour as the peak hour for total usage as shown on the overall Trunk Group Summary Report. Note that on the Wideband Trunk Group Summary Report, the measurements for different trunk groups will not necessarily be time-coincident with each other.

### CAUTION:

*The yesterday-peak and today-peak reports cannot be used to determine narrowband usage except in cases where the peak traffic hour for total usage (shown on the overall report) is the same as the peak hour for wideband usage (shown on this report) for a particular trunk group in the same measurement period. In this case alone, narrowband measurements for that trunk group may be determined by subtracting the wideband measurements from the measurements shown on the overall report for the same trunk group.*

### CAUTION:

*For trunk groups where the peak hour is different on the overall summary report from that shown on the wideband summary report, the narrowband usage must be determined by using the measurements on the Wideband Trunk Group Hourly Report. In addition, if there were calls blocked at that time, the group should be studied using both the overall and wideband hourly reports to determine whether wideband calls were blocked.*

## Wideband Trunk Group Hourly Report

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The Wideband Trunk Group Hourly Report shows the wideband call activity for each hour in the current 24-hour period. A separate report is generated for each measured wideband trunk group.

For trunk groups having mixed wideband and narrowband traffic, it is best to administer the trunk group to appear on both the overall and wideband hourly trunk group reports. In this way a complete picture of usage and blockages is possible. For these trunk groups, direct comparisons can be made between measurements for the same hour on the overall and wideband reports. For

example, if the hour beginning at 1:00 p.m. is examined for the same trunk group on both the overall hourly report and on the wideband hourly report, the narrowband usage measurements may be determined by subtracting the wideband data from the overall data. This can be done for each hour in the 24-hour period.

Note that some measurements, such as trunks-out-service and all-trunks-busy, will be identical for the same hour on the wideband and overall reports for the same trunk group.

## Performance Considerations

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Although the DEFINITY ECS supports wideband transmission for from 2 to 30 channels, the most common transmissions are at the H channel rates:

H Rate	Speed	# 64-Kbps Channels
H0	384 Kbps	6
H11	1.536 Mbps	24
H12	1.920 Mbps	30

When considering how many trunks to put in a trunk group that supports wideband call activity, remember that:

- Every wideband call must be carried on a single DS1 interface. That is, when the bandwidth on one interface is insufficient for the call, another interface must be found that can accommodate the entire call. The bandwidth for the call *cannot* be spread over 2 or more interfaces. The chances for finding enough bandwidth on a single interface are far less than finding the bandwidth on several interfaces.
- Some far end switches (for example, the 4ESS) require that the bandwidth for a call be contiguous. That is, not only must the call be carried over a single interface, but the channels over which the call is carried must be consecutively numbered. The chances for finding contiguous bandwidth are far less than for finding the bandwidth on a single interface alone.

To increase the chances of providing the bandwidth that a wideband call requires, either put as many trunks as possible in the trunk groups you have designated for wideband call usage or put as many trunk groups as possible in the wideband routing pattern.

## Processor Occupancy Reports

# 4

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### Processor Occupancy Reports

---

The term Processor Occupancy (or simply, Occupancy) is defined as the percentage of time that the switch processor is busy performing call processing tasks, maintenance tasks, administration tasks, and the operating system tasks. As a contrast, the percentage of time that the processor is not used is referred to as Idle Occupancy.

The primary objectives of the processor occupancy reports are:

- To provide a summary of customer usage data so that processor occupancy and available capacity can be determined.
- To display, on a per time interval basis, the processor occupancy and associated calling rates which facilitates the isolation of certain customer reported problems.

There are five different processor occupancy commands. These commands are:

- **list measurements occupancy summary**
- **list measurements occupancy last-hour**
- **list measurements occupancy busiest-intervals**
- **list measurements occupancy pktint (Release 5r only)**
- **list measurements communications-links**

The first three commands provide processor occupancy data and associated call traffic for different measurement intervals. The pktint report provides 24 hours of occupancy data for each of the processor packet interface (pktint) boards in the system. The last command provides a picture of the traffic data that is generated on each processor interface link.

The processor occupancy commands may be executed from all user logins if allowed to. However, for most systems, the two primary users will be (1) the customers' telecommunications manager, and (2) the service technician.

The type of application can significantly affect processor occupancy. For purposes of determining processor occupancy, the customers' calling traffic is defined as one of the following applications:

- **General Business** — The majority of applications. It does not include the impact of the Inbound Call Management (ICM)/Call Management System (CMS) or CallVisor Adjunct Switch Applications Interface (ASAI)/Outbound Call Management (OCM) applications.
- **ICM/CMS** — Only includes the impact due to the ICM traffic (using the ACD, Call Vectoring, CallVisor ASAI and CMS features).
- **CallVisor ASAI/OCM** — Only includes the impact due to ASAI/OCM applications.

 **NOTE:**

A particular switch may have a traffic load that consists of any combination of the three defined applications.

Depending on the customers' specific application, the calling traffic may be as simple as a single switch with only CO trunks and analog sets or as complex as a switch in a multinode private network that uses both DCS and ISDN features and is configured with digital sets. In order to describe this wide range of traffic, four call categories are defined. The call categories are:

- **Intercom (INTCOM)** — Locally made and completed station-to-station calls.
- **Incoming (INC)** — Calls which come into the switch over trunks from a CO. The following trunk types are considered public network incoming (CO, DID, FX, WATS, and ISDN-PRI calls that have a public network service type).
- **Outgoing (OUT)** — Calls which exit the switch on trunks that terminate in a CO. The following trunk types are considered public network outgoing (CO, WATS, FX, and ISDN-PRI calls that have a public network service type).
- **Private Network (PNET)** — Incoming and outgoing calls that are made over private network trunks. The following trunk types are considered private network (Access, CPE, DMI-BOS, RLT, Tandem, Tie, APLT, and ISDN-PRI that have a private network service type).

A customer's Usage Profile is defined as the percent mix of traffic from each of the four call categories. An example of one Customer Usage Profile would be: INTCOM = 34%, INC = 33%, OUT = 33%, and PNET = 0%. Obviously, many other different combinations are also possible.

Once the traffic application, usage profile, and certain feature use loading factors have been determined it is then possible to calculate the Busy Hour Call Capacity (BHCC). The BHCC is a measure of the switch's capacity and is defined as the maximum number of completed calls the switch can support in an hour without degradation of service.

It should also be understood that, as a part of the RFP process, Lucent Technologies marketing, when given a description of the customer's usage profile, traffic application, and certain feature use loading factors for the proposed switch, can calculate the theoretical maximum BHCC for the specified application. This enables the determination of whether the proposed switch will accommodate the traffic load. This number, the theoretical maximum BHCC, is an estimate and is referred to as the predicted maximum BHCC.

## The Summary Command

This section describes the Summary Command and the Processor Occupancy Summary Report.

### When to Use the Summary Command

The main function of this command is to answer the question, "How much of the system is being used?" More specifically, this command should be used whenever you want to:

- Monitor resource usage
- Validate the customer's usage profile (for example, once the switch is installed and calling traffic is normal, use the summary reports to determine if the actual usage profile is the same as the estimated usage profile)
- Determine the idle occupancy and how much is available for growing the switch
- Determine the processor occupancy and call levels on an hourly basis for the last 24 hours

## Processor Occupancy Summary Report

### Command

To display the Processor Occupancy Summary Report, enter:

**list measurements occupancy summary [print or schedule]**

Options: The print and schedule options are available for this command.

**Screen**

[Screen 4-1](#) and [Screen 4-2](#) show typical output for the Processor Occupancy Summary Report. The time and date that the report was requested are displayed at the top right of the screen.

[Table 4-1](#) describes the data fields presented in the Processor Occupancy Summary Report, as well as the Last Hour and Busiest Interval Reports.

```
list measurements occupancy summary                                     Page 1
Switch Name: Cust_Switch_Name                                         Date: 11:33 am TUE JUL 31, 19xx
      OCCUPANCY SUMMARY MEASUREMENTS
      Peak Hour For Occupancy: 0900
Meas Static CP   Sm Idle Total Tandem Total Intcom Inc   Out   Pnet
Hour Occ  Occ  Occ Occ  Calls Calls  Atmpts Atmpts Atmpts Atmpts Atmpts
1900 5    58  15  22  761  149   989   247  193  251  298
1800 5    58  16  21 1032  165  1341  335  371  301  334
1700 5    57  16  22 1442  273  1875  468  451  421  535
1600 5    58  15  22 2301  365  2991  747  710  753  781
1500 5    57  15  22 2769  476  3509  877  932  748  952
1400 5    58  15  22 2959  483  3846  961  991  928  966
1300 5    57  15  23 2997  499  3896  974 1021  900 1001
1200 5    59  15  21 4221  923  5487 1371 1520  745 1851
1100 5    59  15  21 5001  826  6501 1625 2000 1223 1653
1000 4    59  13  24 5241  915  6813 1703 2066 1165 1879
      press CANCEL to quit -- Press NEXT PAGE to continue
```

**Screen 4-1. Processor Occupancy Summary Report — Page 1**

```
list measurements occupancy summary                                     Page 2
Switch Name: Cust_Switch_Name                                         Date: 11:33 am TUE JUL 31, 19xx
      OCCUPANCY SUMMARY MEASUREMENTS
      Peak Hour For Occupancy: 0900
Meas Static CP   Sm Idle Total Tandem Total Intcom Inc   Out   Pnet
Hour Occ  Occ  Occ Occ  Calls Calls  Atmpts Atmpts Atmpts Atmpts Atmpts
0900 5    65  12  18 5392 1002  7011 1752 2045 1203 2011
0800 5    64  14  17 5364  941  6973 1743 2056 1283 1891
0700 5    58  15  22 5423  935  7049 1762 2070 1346 1871
0600 6    60  17  17 4399  761  5719 1430 2195  569 1525
Command successfully completed
Command:
```

**Screen 4-2. Processor Occupancy Summary Report — Page 2**

**Table 4-1. Processor Occupancy Summary Report**

Field	Description
Meas Hour	<i>Measurement Hour.</i> The starting time (using 24-hour clock) of the hour during which the data was recorded. Data is listed beginning with the most recently completed hour in the preceding 24-hour interval. Refer to the <i>DEFINITY Enterprise Communications Server Release 5 System Description and Specifications</i> , for additional details.
Meas Minute	<i>Measured Minute.</i> (Last-Hour Report) The end-time of the 3-minute interval for which the measurement is taken. It takes the form hh:mm, where "hh" is the hour and "mm" is the end-time for the 3-minute interval.
Date of Occurrence	(Busiest-Interval Report) The date and end-time of the 3-minute interval for which the data was collected. It takes the form MM/dd/mm:hh, where "MM" is the month, "dd" is the day, "hh" is the hour and "mm" is end of the 3-minute interval.
Stat Occ	<p><i>Static Occupancy.</i> The amount of time (in CCS) taken by high priority background processes in support of call processing, maintenance, and administration functions. Examples of this activity are high level sanity checks, system timing, polling of adjuncts, and operating system support. This also includes some call processing occupancy for BX.25 and ISDN-PRI traffic.</p> <p><b>⇒ NOTE:</b>                      Static Occupancy remains fairly consistent in an idle switch. However, it increases as traffic is introduced into the system.</p>

*Continued on next page*

**Table 4-1. Processor Occupancy Summary Report — Continued**

Field	Description
CP Occ	<p><i>Call Processing Occupancy.</i> The amount of time (in CCS) taken by call processing level processes. The processing of CDR, DCS, ISDN, and other adjunct interfaces is also included in this level. Note that some occupancy due to BX.25 and ISDN-PRI call traffic is counted as static occupancy instead of CP Occ.</p> <p> <b>NOTE:</b>                      It is not desirable for any system to function at 100 percent Processor Occupancy. Rather, the CP Occ and Stat Occ fields should total no more than a maximum of 75 percent. By maintaining this 75 percent maximum limit, other system functions can be performed and bursts of caller activity can also be accommodated.</p> <p><b>Suggested Actions:</b> If the 75 percent maximum limit is exceeded, then you should take one or more of the following steps to lower Call Processing Occupancy:</p> <p>Item #1                      If the users do not get a dial tone immediately, they should be encouraged to wait 10 to 15 seconds before going on-hook and off-hook again.</p> <p>Item #2                      If the switch is part of a private network and is receiving a large amount of traffic from another switch in the private network, then investigate the possibility of reconfiguring the network.</p> <p>Item #3                      Check the administration translation and verify that all digital sets, which are administered with display modules, actually have display modules. For those sets that do not have display modules, you should change the administration translations to indicate that the digital sets do not have a display module.</p> <p>Item #4                      Check the hardware error log for high levels of maintenance activity.</p>

*Continued on next page*

**Table 4-1. Processor Occupancy Summary Report — Continued**

Field	Description
Sm Occ	<p><i>System Management Occupancy.</i> The amount of time taken by lower priority activities such as administration and maintenance command processing, maintenance activity, error logging, and Light-Emitting Diode (LED) audits. Refer to your <i>DEFINITY Enterprise Communications Server Release 5 System Description and Specifications</i>, for additional details.</p>
Idle Occ	<p><i>Idle Occupancy.</i> The amount of time that the processor is unused. There are several factors that drive down this number, including:</p> <ul style="list-style-type: none"> <li>— a large offered load that increases CP occupancy</li> <li>— a switch with many stations and trunks requires a high level of background maintenance, increasing SM occupancy</li> <li>— frequent demand testing or administration, increasing SM occupancy</li> </ul> <p>These factors may reduce the idle occupancy to almost 0% during several 3-minute intervals. On a heavily-loaded switch with frequent demand testing, the idle occupancy may drop to low levels for longer periods (perhaps 1–2 hours). These situations are normal and do not indicate a problem with the switch.</p> <p>However, a lightly-loaded switch with few stations translated and little demand maintenance or administration should not experience long periods of low idle occupancy (less than 15%). If this is the case, a problem is likely.</p>
Total Calls	<p><i>Total Calls.</i> The total number of calls connected during the listed hour. Calls are counted in the time interval they are answered and not in the time interval they are dropped. Therefore, a call that starts in one time interval and ends in another is counted only in the time interval where it originates.</p>
Tandem Calls	<p><i>Tandem Calls.</i> The number of trunk-to-trunk calls connected during the last hour.</p>

*Continued on next page*

**Table 4-1. Processor Occupancy Summary Report — Continued**

Field	Description
Total Atmpts	<p><i>Total Attempts.</i> The number of call attempts made during the measurement interval. The following occurrences count as an attempt:</p> <ul style="list-style-type: none"> <li>■ A user lifts the station handset and hangs up before dialing any digits (off-hooks)</li> <li>■ A user lifts the station handset, dials the destination number, the far end rings but does not answer, and the user hangs up (no answer)</li> <li>■ A user lifts the station handset, dials the destination number, the far end is busy</li> <li>■ A user places a call that is answered by the dialed number</li> <li>■ A user conferences a second party onto the call</li> <li>■ An incoming trunk seizure</li> <li>■ Maintenance requests that an outgoing trunk be seized</li> <li>■ Tandem calls (either pnet or public network) result in 2 attempts, but only one total call</li> <li>■ AUDIX audits of message waiting lamps</li> <li>■ AUDIX Leave Word Calling activations</li> </ul> <p><b>⇒ NOTE:</b>                      Mathematically, the Total Atmpts field is the total of the Intcom, Inc, Out, and Pnet attempts.</p>
Intcom Atmpts	<p><i>Intercom Attempts.</i> This field includes the sum of two types of calls. The first type is extension-to-extension calls on the same switch. The second type is partially completed calls where a local extension goes off-hook and then hangs up before the call is answered. This includes both busy and no-answer calls.</p>

*Continued on next page*

**Table 4-1. Processor Occupancy Summary Report — Continued**

Field	Description
Inc Atmpts	<i>Incoming Attempts.</i> The number of incoming trunk seizures from public network facilities.
Out Atmpts	<i>Outgoing Attempts.</i> The number of outgoing trunk seizures that are made over public network facilities.
Pnet Atmpts	<p><i>Private Network Attempts.</i> The number of incoming and outgoing seizures that are made over private network facilities. Note that a tandem call is counted as two private network attempts, since it includes both incoming and outgoing trunk seizures.</p> <p><b>⇒ NOTE:</b>                      The determination of whether a call is over public network or over private network facilities depends on the trunk type (for ISDN-PRI facilities it is also dependent on the service type).</p>

## The Last-Hour Command

### When to Use the Last-Hour Command

The main function of the **last-hour** command is to:

- Provide a detailed view of the occupancy levels for the last-hour
- Identify potential load related problems that may have occurred during the last hour

## Processor Occupancy Last-Hour Measurements Report

### Command

To display the Processor Occupancy Last-Hour Report, enter:

**list measurements occupancy last-hour [print or schedule]**

**Options:** The print and schedule options are available for this command.

### Screen

[Screen 4-3](#) shows typical output for the Processor Occupancy Last-Hour Measurements Report. The time and date that the report was requested are displayed above and to the right of the name of the report.

```
list measurements occupancy last-hour                               Page 1
Switch Name: Customer_Switch_name                               Date: 3:13 pm MON NOV 11, 19xx
OCCUPANCY LAST-HOUR MEASUREMENTS
Meas  Static CP   Sm  Idle Total  Tandem Total  Intcom Inc   Out  Pnet
Minute Occ  Occ  Occ  Occ  Calls  Calls  Atmpts  Atmpts Atmpts Atmpts Atmpt
15:11  2   5  26  67   646   710   1421    0    0    0    1421
15:08  4   5  22  69   641   704   1412    0    0    0    1412
15:05  5   6  25  64   639   705   1410    0    0    0    1410
15:02  4   6  24  66   645   710   1420    0    0    0    1420
14:59  3   4  22  71   639   703   1411    2    0    0    1409
14:56  3   5  24  68   639   704   1412    2    0    0    1410
14:53  6   6  24  64   645   704   1418    3    0    0    1415
14:50  4   5  27  64   641   707   1418    3    0    0    1415
14:47  4   6  19  71   648   706   1429    3    0    0    1426
14:44  2   5  26  67   639   701   1405    3    0    0    1402
14:41  4   14 19  63  1624  1075  2399   243    0    0    2156
14:38  6   15 28  51  1786  1133  2556   290    0    0    2266

Command successfully completed
Command:
```

### Screen 4-3. Processor Occupancy Last-Hour Measurements Report

#### NOTE:

The fields on this report are the same as the summary report, but the data is calculated over a 3-minute time interval. The Meas Minute field represents the end of the time interval.

## Using the Last-Hour Report to Resolve Problems

The following list identifies some areas that may be pursued when investigating a problem that is believed to be processor occupancy (load) related.

1. For the identified 3-minute time interval (the time when the problem occurred), multiply the number in the `Total Calls` field by 20. If the product exceeds the advertised BHCC of the switch, then it is the load for this time interval that is causing the problem. If the product does not exceed the BHCC for the switch, then this load is not the problem.
2. For the identified 3-minute time interval (the time when the problem occurred), compare the number in the `Total Attempts` field with the `Total Calls` field. If the number of attempts is significantly greater than the number of calls, then a significant percent of the occupancy is due to call processing stimuli that do not result in completed calls.
3. Examine the hardware error log for an excessive amount of maintenance activity (for example, a high number of errors).
4. Refer to the **list measurements communications-links** report to determine if any of the links are receiving an abnormal amount of traffic.
5. Check with the users to determine if a certain feature(s) was being used heavily during the identified time interval.
6. Refer the problem to maintenance personnel with the suggestion that they check the software error log.

## The Busiest-Interval Command

This section describes the Processor Occupancy Busiest-Interval Measurements report.

### When to Use the Busiest-Interval Command

The main function of the **busiest-interval** command is to provide a long-term history report of potential performance-related problems.

#### NOTE:

This report provides a collection of the 20 busiest 3-minute intervals within the last two months. Therefore, this command is most useful to the service technician for investigating habitual performance problems or those problems that are not reported exactly when they happen.

## Processor Occupancy Busiest-Interval Measurements Report

### Command

To display the Processor Occupancy Busiest-Interval Measurements Report, enter:

**list measurements occupancy busiest-intervals [print/schedule]**

**Options:** The print and schedule commands are available for this command.

### Screen

[Screen 4-4](#) show typical output for the Processor Occupancy Busiest-Interval Measurements Report. The time and date that the report was requested are displayed above and to the right of the name of the report. The **Date of Occurrence** field identifies the month, day, and time of day for 20 of the busiest intervals (that is, the sum of Stat Occ + CP Occ). All other fields are described in [Table 4-1](#).

```
list measurements occupancy busiest-intervals Page 1
Switch Name: Customer_Switch_Name Date: 3:13 pm MON NOV 11, 1991
OCCUPANCY BUSIEST 3-MINUTE INTERVALS MEASUREMENTS
Date of      Static CP   Sm Idle Total Tandem Total  Intcom Inc   Out   Pnet
Occurrence  Occ   Occ   Occ Occ  Calls Calls  Atmpts Atmpts Atmpts Atmpts Atmpts
11/11/10:20 16    9    26 49   686 490   1225 245   0    0    980
11/11/11:14 8     16   27 49   1788 1130 2558 286   0    0    2272
11/11/12:38 7     15   21 57   1786 1131 2554 286   0    0    2268
11/11/13:41 6     16   26 52   1786 1129 2553 290   0    0    2263
11/11/14:11 7     15   25 53   1780 1135 2557 285   0    0    2272
Command successfully completed
Command:
```

### Screen 4-4. Processor Occupancy Busiest-Interval Measurements Report

#### ➤ NOTE:

The fields on this report are the same as on the summary report. However, the data is calculated over 3-minute intervals rather than 1-hour intervals.

## Using the Busiest-Interval Report to Resolve Problems

---

The following list identifies some areas that may be pursued when investigating a problem that is believed to be processor occupancy (load) related.

1. For the identified 3-minute time interval (the time when the problem occurred), multiply the number in the `Total Calls` field by 20. If the product exceeds the advertised BHCC of the switch, then it is the load for this time interval that is causing the problem. If the product does not exceed the BHCC for the switch, then this load is not the problem.
2. For the identified 3-minute time interval (the time when the problem occurred), compare the number in the `Total Atmpts` field with the `Total Calls` field. If the number of attempts is significantly greater than the number of calls, then a significant percent of the occupancy is due to processing off-hook and on-hook stimuli that do not result in a completed call.
3. Examine the hardware error log for an excessive amount of maintenance activity (for example, a high number of errors).
4. Refer to the **list measurements communications-links** report to determine if any of the links are receiving an abnormal amount of traffic.
5. Check with the users to determine if a certain feature(s) was being used heavily during the identified time interval.
6. Refer the problem to maintenance personnel with the suggestion that they check the software error log.

After a serious performance problem has been detected and corrected, you can execute the **clear measurements occupancy busiest-intervals** command and clear the log of busiest entries. This allows attention to be focused on any current performance problems.

### NOTE:

The **clear measurements occupancy busiest-intervals** command should only be used to clear out data from resolved problems.

## The Pktint Command

---

This section describes the Processor Occupancy Pktint Command. This command is available on the Release 5r switch.

### When to Use the Pktint Command

---

Use the Pktint command to provide a 24-hour history of the occupancy of each of up to three packet interface (pktint) boards.

## Processor Occupancy Pktint Report

### Command

To display the Processor Occupancy Pktint Report, enter:

**list measurements occupancy pktint [print or schedule]**

**Options:** The print and schedule options are available for this command.

### Screen

[Screen 4-5](#) shows typical output for the Processor Occupancy Pktint Report. [Table 4-2](#) describes those fields that are unique to the Processor Occupancy Pktint Report.

```
list measurements occupancy pktint
Switch Name: Customer_Switch_Name      Date:  5:35 pm  FRI NOV 22, 1991
      PROCESSOR PACKET INTERFACE REPORT
Meas      PKT_INT1      PKT_INT2      PKT_INT3
Hour      Occ          Occ          Occ
1600      2              0  BRDNINST  0  BRDNINST
1500      2              0  BRDNINST  0  BRDNINST
1400      2              0  BRDNINST  0  BRDNINST
1300      2              0  BRDNINST  0  BRDNINST
1200      2              0  BRDNINST  0  BRDNINST
1100      2              0  BRDNINST  0  BRDNINST
1000      2              0  BRDNINST  0  BRDNINST
 900      2              0  BRDNINST  0  BRDNINST
 800      2              0  BRDNINST  0  BRDNINST
 700      2              0  BRDNINST  0  BRDNINST
 600      2              0  BRDNINST  0  BRDNINST
 500      2              0  BRDNINST  0  BRDNINST
press CANCEL to quit -- press NEXT PAGE to continue
```

**Screen 4-5. Processor Occupancy Pktint Report**

**Table 4-2. Processor Occupancy Pktint Report**

Field	Description
Meas Hour	<i>Measurement Hour.</i> The starting hour in which the measurements are taken.
PKT-INTN Occ	N is either 1, 2, or 3, representing each of the 3 PKTINT boards. The percent occupancy is retrieved from each PKTINT board for the hour. If a board is not inserted, this field will display a 0 with the note <b>BRDNINST</b> indicating that the board was not inserted. If the board is out of service this field will display a 0 with the note <b>OUTSERV</b> indicating that the board was out of service. If the data cannot be retrieved from the board because of some internal problem, this field will display a 0 with the note <b>DA_N_AVAIL</b> indicating that the data cannot be retrieved.  <b>Suggested Action:</b> The occupancy should generally run about two percent. At occupancy nears 100%, you should consider adding another PKTINT.

## The Communications Links Command

This section describes the Processor Occupancy Communications Links command.

### When to Use the Communications Links Command

The main function of the communications links command is to:

- Obtain a report that facilitates the monitoring of traffic over the processor interface links
- Determine if it is necessary to perform load balancing
- Identify defective processor interface links

#### **NOTE:**

The three processor occupancy commands described earlier may (depending upon the application) indicate that the switch is running at capacity, in keeping with user perceptions. However, these commands, with the exception of pointing to a call overload, do not provide any extra information as to why it is running at capacity. This command provides additional insight into how the processor

interface links affect occupancy (for example, link overload, link transmission problems, etc.).

## Processor Occupancy Communications Link Measurements Report

### Command

To display the Processor Occupancy Communications Links Measurements Report, enter:

**list measurements communications-links xx-yy [print/schedule]**

Substitute either "1-8" or "9-16" for "xx-yy" on the command line.

**Options:** The print and schedule options are available for this command.

### Screen

[Screen 4-6](#) and [Screen 4-7](#) show typical output for the Processor Occupancy Communication Link Measurement Report. The time and date that the report was requested are displayed above and to the right of the name of the report. [Table 4-3](#) describes the data fields presented in [Screen 4-6](#) and [Screen 4-7](#).

```
list measurements communications-links 1-8                               Page 1
Switch Name: Cust_Switch_Name                                           Date:  1:55 pm  TUE JUL 31, 1990
COMMUNICATION LINK MEASUREMENTS
Meas  Link    Link    Link    Link    Link    Link    Link    Link
Hour  1        2        3        4        5        6        7        8
1200  10471   576     24      4        0        40      2        0
1100  13764   612     24      14       0        313     4        0
1000  12217   550     24      4        0        36      9        0
900   12365   601     26      4        0        32      2        0
800   12630   559     28      4        0        36      4        0
700   12714   412     24      4        0        36      4        0
600   12531   299     24      4        0        40      4        0
500   12407   352     24      4        0        42      2        0
400   12173   311     34      4        0        32      2        0
300   12121   301     24      4        0        36      4        0
200   12561   412     24      4        0        36      4        0
100   12501   478     24      4        0        36      2        0
press CANCEL to quit -- Press NEXT PAGE to continue
```

4 Processor Occupancy Reports

Processor Occupancy Communications Link Measurements Report

```
list measurements communications-links 1-8
Switch Name: Cust_Switch_Name
COMMUNICATION LINK MEASUREMENTS
Meas  Link  Link  Link  Link  Link  Link  Link  Link
Hour  1      2      3      4      5      6      7      8
0     12460  345   28    4      0      44    4      0
2300  12413  301   28    4      0      44    4      0
2200  12313  267   24    4      0      26    4      0
2100  12526  472   26    4      0      32    4      0
2000  12297  376   71    4      0      36    4      0
1900  12330  321   24    13     0      32    4      0
1800  12210  283   24    4      0      36    2      0
1700  12549  356   24    4      0      40    2      0
1600  12361  519   34    4      0      23    2      0
1500  12384  494   24    4      0      29    2      0
1400  12422  0      24    4      0      16    2      0
1300  12318  0      26    4      0      32    2      0
Command successfully completed
Command:
```

Page 2

Date: 1:55 pm TUE JUL 31, 1990

**Screen 4-7. Processor Occupancy Communication Measurement Report — Page 2**

It should be realized that the Processor Occupancy Communication Link Reports for each customer application will vary significantly since a particular link on one switch may serve a different function than the same link for another switch. Furthermore, what is considered to be normal link traffic for one service (for example, DCS) may vary widely from what is considered to be normal link traffic for another service (for example, CMS). Therefore, it is recommended that the customer obtain a printed report of what is deemed to be normal traffic (for each switch) and use that report for comparison purposes.

This report is of significant value in determining the long term impact that processor link traffic has on processor occupancy. The report can also be used to identify certain types of link failure (for example, total failure at 1400 hours on link 2 [on Page 2]). However, since the report summarizes data at 1-hour time intervals, some types of intermittent problems are not easily recognized with this

report. Intermittent transmission problems may be more easily identified by reviewing the software error log.

**Table 4-3. Communications Link Measurements Report**

Field	Description
Meas Hour	<i>Measurement Hour.</i> The starting time (using 24-hour clock) of the hour during which the data was recorded. Data is listed beginning with the most recently completed hour and preceding back for 24-hour intervals.
Link #	The links are identified by numbers 1 through 8 or 9 through 16. The numbers in each column represent the number of messages traversing the link. Once a link is established and traffic begins flowing over it, the messages are counted automatically; no command is required.

## Mapping Links to Applications

### Command

To see what applications are running on the links, enter:

**display communications-interface links**

### Screen

[Screen 4-8](#) shows the applications used by each link for a sample configuration in which BX25 is using links 1, 2, 3, and 8.

For a detailed explanation of this screen, refer to *DEFINITY Enterprise Communications Server Release 5 Administration and Feature Description*.

```

display communication-interface links                               SPE B
                                INTERFACE LINKS
Link   Enabled  X.25      Destination  Establish   Connected
        Y        Extension  Number      Connection  Data Module  Identification
1:     Y        34061     external    Connection  34055        cms
2:     n B
3:     Y        34015     3400
4:     n
5:     n
6:     n
7:     n
8:     n
    
```

**Screen 4-8. Processor Occupancy Interface Links Report**

## Data Analysis Guidelines

---

The following guidelines are intended to show an easy method for determining whether currently reported data is acceptable or not. These guidelines represent the minimum that you should do to verify that the recorded measurement values are consistent with expected and historic values. You should perform additional checks as necessary.

To check the acceptability of hourly data, verify that the system clock has not been changed during the measurement hour. If the system clock has been changed, the `Minutes` field will display double asterisks (for example, 11\*\*).

During a partial system reset (for example, 1 or 2, Cold 1, or Cold 2) the measurement data is retained for the affected time interval. However, during a full system reset (for example, 3, 4 or 5) the measurement data is not retained for the affected time interval.

## Analyzing the Data

---

In order to calculate the measured BHCC, you should use the summary report to collect measurement data. Subsequently, you should record data for the identified peak hour on Worksheet 5. After recording four weeks of data, you should calculate the column averages and record the averages in the appropriate row and column at the bottom of Worksheet 5.

### NOTE:

Before recording each day's data you should review the whole day in order to ensure that the peak hour is not the result of an abnormality (for example, caused by a snow storm, etc.). If you determine that the peak hour is the result of an abnormality, then you should disregard that day's data. Additionally, the weeks that you select to record data from should NOT be times of slack business activity. Furthermore, the weeks should NOT be

four consecutive weeks; but should be the weeks from two or more months of normal business activity.

“[WORKSHEET 5](#)” in [Appendix A, “Blank Worksheets”](#) provides space to record seven-day-per-week data. If your application is a five-day operation, then data should only be recorded for the five days (Monday through Friday). When averaging the data, take care to only divide by the number of days that data was actually recorded (for example, 20 or 28).

**Table 4-4. Procedures for Calculating Processor Occupancy**

Step	Description
Step 1.	Is there available sufficient Processor Occupancy to grow the switch? If the sum of Call Processing Occupancy plus Static Occupancy is greater than 70 percent, there is no room to grow and no need to complete Steps 2 through 7. However, if the sum of Call Processing Occupancy plus Static Occupancy is less than 70 percent, continue with the following steps.
Step 2.	Calculate the Usage Profile.  Use the four-week average data (which is obtained from your completed copy of Worksheet 5) to solve the following equations. $\% \text{ INTCOM} = \frac{\text{Int Atmpt}}{\text{Total Atmpt}} \times 100$ $\% \text{ INC} = \frac{\text{Inc Atmpt}}{\text{Total Atmpt}} \times 100$ $\% \text{ OUT} = \frac{\text{Out Atmpt}}{\text{Total Atmpt}} \times 100$ $\% \text{ PNET} = \frac{\text{Pnet Atmpt} - \text{Tandem Calls}}{\text{Total Atmpt}} \times 100$

*Continued on next page*

**Table 4-4. Procedures for Calculating Processor Occupancy — Continued**

Step	Description
Step 3.	<p>Determine the Traffic Application.</p> <p>Is the traffic application ICM/CMS, or CallVisor ASAI/OCM.</p> <p>You can make this determination based on the type of business that is served by the switch, the percentages of incoming and outgoing traffic, and personal knowledge of which features are being used. For example, a General Business application will have a more even (in terms of incoming, outgoing, and intercom) distribution of traffic. An ICM/CMS application will have a high percentage of incoming calls and also provide those features which are specific to ACD or Call Vectoring. Some of these include agent and trunk tracking capability (for example, CMS or BCMS), recurring announcements, etc.</p> <p>If the switch supports more than one traffic application (for example, ICM/CMS as the primary and General Business as the secondary), then the processor occupancy required for the primary application must be determined first and then the remainder is available for the secondary application.</p> <p><b>⇒ NOTE:</b></p> <p>This document describes the method for calculating the BHCC for a simple General Business traffic application. Those switches that provide the DCS, CMS, BCMS, and/or ISDN-PRI feature(s) are termed complex and the Design Center must be consulted in order to calculate their BHCC. All ICM (ACD and Call Vectoring), ASAI/OCM, and vectoring and interflow/traffic applications are also termed complex and currently are only evaluated by the Design Center. For more information contact your Account Team.</p>
Step 4.	<p>Determine the maximum number of calls the switch should be able to complete in one hour.</p> <p>In order to make this determination, you should refer to the configuration guidelines for the switch.</p>

*Continued on next page*

**Table 4-4. Procedures for Calculating Processor Occupancy — Continued**

Step	Description
Step 5.	<p>Determine the normal calling rate for the given level of occupancy.</p> <p>a. First, calculate how many completed calls the switch should be making for the given level of occupancy. This number is referred to as Calls predicted.</p> $Calls\ Predicted = \frac{Static\ Occ + CP\ Occ}{70} \times BHCC$ <p><b>⇒ NOTE:</b></p> <p>1) The divisor number, 70, is the constant from Step 1 and refers to the percentage of the processor used by call processing.</p> <p>2) The number for BHCC is the number that is obtained in Step 4.</p> <p>b. Second, compare the Calls Predicted number to the four-Week average Total Calls field on Worksheet 5.</p> $Calls\ Predicted < Total\ Calls$ <p style="text-align: center;"><i>or</i></p> $Calls\ Predicted > Total\ Calls$ <p>c. If the Calls Predicted number is less than the Total Calls number, then either the customer has a low feature usage rate or is completing more than 70 percent of calls. Therefore, if additional capacity is used in the same way, the following predictions should provide reliable results.</p> <p>If the Calls Predicted number is greater than the Total Calls number, then either the customer has a high feature usage rate or is completing less than 70 percent of calls. Therefore, care must be taken in predicting how many additional calls can be supported.</p> <p><b>⇒ NOTE:</b></p> <p>If the Calls Predicted number equals or approximately equals the Total Calls number then the customer is using the switch in a typical manner.</p>

**Table 4-4. Procedures for Calculating Processor Occupancy — Continued**

Step	Description
Step 6.	<p>Determine how many additional calls the switch can complete.</p> <p>The number of additional calls can be calculated with the following equation.</p> $\text{Number of Additional Calls} = \frac{\text{Total Calls (4 Week Avg)}}{\text{Static Occ} + \text{CP Occ}} \times (\text{Idle Occ} - 15)$
Step 7.	<p>Determine how many additional extensions can be added.</p> $\text{Additional Extensions} = \frac{\text{Number of Additional Calls}}{\text{Average Number of Calls per Extension}}$ <p><b>⇒ NOTE:</b>                      The Average Number of Calls per Extension depends on the traffic application and other customer-specific operating techniques. If this measurement is not known, then you may use 4.05 (which is a typical figure for a General Business traffic application).</p>



# Security Violations Reports

# 5

---

This chapter describes the Security Violations Reports. There are six security violation reports — a detail report, a summary report, and four status reports. These reports show system management logins, and attempts to use station security codes, authorization codes, and remote access barrier codes. They also provide information about attempts to access the system made within a given time frame.

## Security Violations Summary Report

The system generates a Security Violations Summary Report that displays valid and invalid access attempts, and security violations in each of the categories measured (login, authorization code, barrier code, and station security code).

### Commands

Commands are available to display or clear the Security Violations Detail and Summary reports. To display the reports, enter:

**list measurements security-violations summary/detail [print] or [schedule]**

To reset all counters of the Security Violations reports to zero, enter:

**clear measurements security-violations**

#### **NOTE:**

The Security Violations Summary Report accumulates data until it is cleared. This report *will* overflow; therefore, it should be reviewed and cleared at least once a month.

**Options:** The options **print** and **schedule** apply to these reports.

## Screen

[Screen 5-1](#) displays a typical Security Violations Summary Report. The report header lists the switch name, date and time the report was requested. [Table 5-1](#) describes the data presented in the Security Violations Summary Report.

```

-----
Switch Name: _____ Date: xx:xx am DAY MON xx, 19xx

                SECURITY VIOLATIONS SUMMARY REPORT
                Counted Since: xx:x am DAY MON xx,19xx

Barrier
Codes      Station Security Codes      Authorization Codes
-----
                Orignation
                Station  Trunk  Total  Station  Trunk  Remote  Attd  Total
Valid       0           1     2     3       0     0       0     0     0
Invalid     0           4     6    10       0     0       0     0     0
Sec Viol    0           0     0     3       0     0       0     0     0

Port Type   Successful  Invalid  Invalid  Forced  Login Security  Trivial
Logins      Attempts  IDs     Disconnects  Violations  Attempts
SYSAM-LCL   0          0       0         0       0             0
SYSAM-RMT   0          0       0         0       0             0
MAINT       0          0       0         0       0             0
SYS-PORT    0          0       0         0       0             0

Total       0          0       0         0       0             0
-----
    
```

**Screen 5-1. Security Violations Summary Report**

**Table 5-1. Security Violations Summary Report**

Field	Description
Counted Since	The time at which the counts above were last cleared and started accumulating again, or when the system is initialized.
Barrier Codes	<p>The total number of times a user entered a valid or invalid remote access barrier code, and the number of resulting security violations. Barrier codes are used with remote access trunks.</p> <p>An inexplicable, significant increase in valid barrier code use could indicate that the barrier code has been compromised.</p> <p>A marked increase in this number of invalid codes may indicate someone is <i>attempting</i> to break into your system. If you have just administered a new barrier code, or a barrier code expired recently, it may indicate people are making honest mistakes.</p> <p><b>Suggested Action:</b> Delete or change the barrier code if you suspect it has been compromised.</p>
Station Security Code Origination/Total	<p>The number of calls originating from either stations or trunks that generated valid or invalid station security codes, the total number of such calls, and the number of resulting security violations.</p> <p>A dramatic increase in the number of either valid or invalid attempts may be cause for alarm. Unless recording of TTI/PSA events is turned off, they will appear in the history log. If usage does not seem legitimate, security codes and/or classes of service should be changed.</p>

*Continued on next page*

**Table 5-1. Security Violations Summary Report — Continued**

Field	Description
Authorization Codes	<p>The number of calls, by origination, that generated valid or invalid authorization codes, the total number of such calls, and the number of resulting security violations. Calls are monitored based on the following origination types:</p> <ul style="list-style-type: none"> <li>■ Station</li> <li>■ Trunk (other than remote access)</li> <li>■ Remote Access</li> <li>■ Attendant</li> </ul> <p>If valid authorization code usage increases dramatically, you should investigate. Someone may have obtained valid codes; on the other hand, it may turn out that a number of new, legitimate users have come onto the system.</p> <p>If invalid authorization code usage increases dramatically, you should investigate. Someone may be trying to break into your system. However, a legitimate explanation may be that authorization codes have recently been changed and users are making some honest mistakes. <i>If you suspect Authorization Codes have been compromised, change them.</i></p>

***Continued on next page***

**Table 5-1. Security Violations Summary Report — Continued**

Field	Description
Port Type	<p>The type of port used by the measured login process. If break-ins are occurring at this level, the offender may have access to your system administration. This is an extremely dangerous situation.</p> <p>On the Release 5r, port types can be:</p> <ul style="list-style-type: none"> <li>■ <i>SYSAM-LCL (SYSAM Local Port.):</i> This port on the SYSAM board is typically used as the local connection to the management terminal. It is located in the switch room.</li> <li>■ <i>SYSAM-RMT (SYSAM Remote Port.):</i> The dial-up port on the SYSAM board is typically used by services for remote maintenance and is also used by the switch to call out with alarm information. If system break-ins are being made or attempted using this port, the offender would be someone who has the dial-up number.</li> <li>■ <i>MAINT:</i> These ports on the Expansion Port Networks maintenance boards are typically used as local connections for on site maintenance performed by services. If system break-ins are being made or attempted using this port, the offender would be someone who works in the building.</li> <li>■ <i>SYS-PORT (System Ports):</i> These ports are accessed by dial-up through the TDM bus.</li> </ul>
	<p>On the Release 5vs/si, port types can be:</p> <ul style="list-style-type: none"> <li>■ <i>MGR1:</i> The dedicated system administration terminal connection.</li> <li>■ <i>NET:</i> The network controller dial-up ports.</li> <li>■ <i>EPN:</i> The EPN maintenance EIA port.</li> <li>■ <i>INADS:</i> The Initialization and Administration System port.</li> </ul>
Total	Measurements totaled for all the above port types.
Successful Logins	The total number of successful logins into SM (i.e., the login ID and the password submitted were valid) for the given port type.

*Continued on next page*

**Table 5-1. Security Violations Summary Report — Continued**

Field	Description
Invalid Login Attempts	<p>The total number of login attempts where the attempting party submitted an invalid login ID or password while accessing the given port type.</p> <p> <b>NOTE:</b>                      Look for numbers that are significantly higher than normal. Invalid attempts do not include cases where a user makes several attempts to logon and is successful on the second or third attempt. (A user is given three tries at logging on before being disconnected.)</p>
Invalid Login IDs	<p>The total number of unsuccessful login attempts where the attempting party submitted an invalid login while accessing the given port type.</p>
Login Forced Disconnects	<p>The total number of login processes that were disconnected automatically by the switch because the threshold for consecutive invalid login attempts had been exceeded for the given port type. The threshold is three attempts.</p>
Login Security Violations	<p>The total number of login security violations for the given port type.</p> <p>As with barrier code attempts, the user can define the meaning of a security violation by setting two parameters administratively:</p> <ol style="list-style-type: none"> <li>1. The number of unsuccessful logins</li> <li>2. The time interval</li> </ol> <p>A login security violation notification is sent to the attendant console or a station with a display when the number of unsuccessful logins is exceeded within the administered interval of time.</p>
Login Trivial Attempts	<p>The total number of times a user connected to the system and gave no input to the login sequence. A large number of trivial attempts could mean that the dial-up numbers have been accidentally distributed to the wrong personnel.</p>

## Security Violations Detail Report

The Security Violations Detail Report provides system management login data per login identification. It relates only to system administration.

### ⇒ NOTE:

If you have recently added login IDs, these will not appear in the detail report (either as successful or not) until the next hourly update or until you enter the "clear measurements security violations" command. Similarly, logins that you remove, and that are subsequently used in login attempts, will be included in the Security Violations Detail Report until the next hourly update or until you enter the "clear measurements security violations" command.

## Screen

[Screen 5-2](#) and [Screen 5-3](#) are typical screens for the Security Violations Detail Report for Release 5r systems. [Table 5-2](#) describes those data fields presented in the Security Violations Detail Report.

```
list measurements security-violations detail                               Page 1  SPE A
Switch Name: Definity In-House                                           Date: 1:21 pm MON OCT 21, 19xx
                                SECURITY VIOLATIONS DETAIL REPORT
                                Counted Since: 9:42 am TUE OCT 15, 19xx
                                Successful      Invalid
Login ID  Port Type      Logins      Passwords
init      SYSAM-LCL        6           0
          SYSAM-RMT        0           0
          MAINT           0           0
          SYS-PORT       191         3
          Total          197         3
inads     SYSAM-LCL        0           0
          SYSAM-RMT       11          1
          MAINT           0           0
          SYS-PORT       22          1
          Total          33          2
press CANCEL to quit -- press NEXT PAGE to continue
```

**Screen 5-2. Security Violations Detail Report — Page 1**

**Table 5-2. Security Violations Detail Report**

Field	Description
Login ID	<p>The login identification submitted by the party attempting to login. Login IDs include the valid system login IDs.</p> <p><b>⇒ NOTE:</b>                      If you see a large number of invalid attempts where an invalid ID is used, this may indicate unauthorized use by an individual who does not have access to valid login IDs. On the other hand, if the invalid attempts involve invalid passwords being used, whoever is trying to break in does know the ID. Review the Valid ID attempts to see which ones had invalid passwords connected with them.</p>
Port Type	<p>The type of port where login attempts were made.</p> <p>Release 5r:</p> <ul style="list-style-type: none"> <li>■ SYSAM-LCL (SYSAM Local Port): This port on the SYSAM board is typically used as the local connection to the management terminal. It is located in the switch room.</li> <li>■ SYSAM-RMT (SYSAM Remote Port): The dial-up port on the SYSAM board is typically used by services for remote maintenance and is also used by the switch to call out with alarm information.</li> <li>■ MAINT: These ports on the Expansion Port Networks maintenance boards are typically used as local connections for on-site maintenance performed by services.</li> <li>■ SYS-PORT (System Ports): These ports are accessed by dial-up through the TDM bus.</li> </ul> <p>Release 5vs/si:</p> <ul style="list-style-type: none"> <li>■ <i>MGR1</i>: The dedicated system administration terminal connection.</li> <li>■ <i>INADS</i>: The Initialization and Administration System port</li> <li>■ <i>EPN</i>: The EPN maintenance EIA port.</li> <li>■ <i>NET</i>: The network controller dial-up ports.</li> </ul>
Successful Logins	<p>Total number of times a login was used successfully to log into the system for the given port type.</p>
Invalid Passwords	<p>The total number of login attempts where the attempting party submitted an invalid password for the given port type and login ID.</p>

## Security Violations Status Reports

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The security violations reports provide current status information for Login, Remote Access (barrier code), or Authorization Code or Station Security Code violation attempts. The data displayed by these reports is updated every 30 seconds. A total of 16 entries is maintained for each type of violation. The oldest information is overwritten by the new entries at each 30-second update. The security violations report is divided into four distinct reports:

- Login Violations
- Remote Access Barrier Code Violations
- Authorizations Code Violations
- Station Security Code Violations

To access Monitor Security Violations reports, enter the command interface command **monitor security-violations <report name>**. The report names are "login," "remote-access," "authorization-code," and "station-security-code."

### Login Violations

---

To determine login violations, the system monitors the following ports:

- System administration terminal connected within 50 feet of the system cabinet
- Customer Support Service Organization (CSSO)
- Dial-up ports that use the switch fabric. These are normally used by CSSO.
- Expansion Port Networks (EPN) Maintenance Ports. These ports are typically used as local connections by services for on site maintenance.

```
-----
monitor security-violations login
-----
```

```
SECURITY VIOLATIONS STATUS
```

```
Date: NN:nn DAY MON nn 199n
```

```
LOGIN VIOLATIONS
```

```

Date      Time      Login      Port      Ext
01/08     07:51     root       NET-1     4030
01/08     07:51     admin      NET-1     4030
01/07     07:52     cust       rcust     MGR1
-----
-----
```

### Screen 5-3. Login Violations Report

The following fields are displayed on the Login Violations report:

**Table 5-3. Login Violations Report**

Field	Description
Date	The date that the attempt occurred.
Time	The time that the attempt occurred.
Login	The login string that was entered as part of the invalid login attempt. An invalid password may cause an invalid attempt. Entry of an invalid password results in an invalid login attempt. In this case the valid login ID associated with the attempt is displayed.
Port	The port on which the failed login session was attempted.
Ext	The extension assigned to the network controller board that the failed login session was attempted on. This field is present only on reports from Release 5si systems. It contains an entry only if the System Administrator's management terminal is administered through a network controller port.  This field is not present on reports produced by the Release 5r.

## Remote Access Barrier Code Violations

```
-----
monitor security-violations remote-access
-----
```

SECURITY VIOLATIONS STATUS

Date: NN:nn DAY MON nn 199n

REMOTE ACCESS BARRIER CODE VIOLATIONS

Date	Time	TG No	Mbr	Ext	Bar-Cd	CLI/ANI
01/08	10:55	31	5	4050	1030	2025551234
01/08	10:54	31	1	4050	2345	5559876

### Screen 5-4. Remote Access Barrier Code Violations Report

The following fields are displayed on the Remote Access Violations report.

**Table 5-4. Remote Access Barrier Code Violations**

Field	Description
Date	The date that the attempt occurred.
Time	The time that the attempt occurred.
TG No	The number of the remote access trunk group over which the barrier code was sent.
Mbr	The number of the remote access trunk group member over which the barrier code was sent.
Ext	The extension used to interface with the Remote Access feature.
Bar-Cd	The incorrect barrier code that resulted in the invalid attempt.
CLI/ANI	The calling line identifier or automatic number identification, when available on the incoming message, of the party making the invalid attempt.

## Authorization Code Violations

---

-----  
monitor security-violations authorization-code  
-----

SECURITY VIOLATIONS STATUS  
Date: NN:nn DAY MON nn 199n

AUTHORIZATION CODE VIOLATIONS

Date	Time	Originator	Auth-Cd	TG No	Mbr	Bar-Cd	Ext	CLI/ANI
01/07	08:33	STATION	1234567				84321	
01/06	07:32	TRUNK	1233555	35	14			3035551234
01/03	14:22	REM ACCESS	2222	31	3	3295912		5556789
12/25	16:45	ATTENDANT	1212111				84000	

Screen 5-5. Authorization Code Violations Report

The following fields are displayed on the Authorization Code Violations report.

**Table 5-5. Authorization Code Violations Report**

<b>Field</b>	<b>Description</b>
Date	The date that the attempt occurred.
Time	The time that the attempt occurred.
Originator	The type of resource from which the invalid access attempt originated. Originator types include: <ul style="list-style-type: none"> <li>■ Station</li> <li>■ Remote Access (when the invalid authorization code is associated with an attempt to invoke the Remote Access feature).</li> <li>■ Attendant</li> </ul>
Auth-Cd	The invalid authorization code entered.
TG No	The trunk group number of the trunk where the attempt originated. It appears only when the originator type is "trunk" or "remote access" and an invalid authorization code was entered.
Mbr	The number of the trunk in the trunk group where the attempt originated.
Bar-Cd	The valid barrier code that was entered with the invalid authorization code. It appears only when an authorization code is required to invoke Remote Access, following entry of the barrier code.
Ext	The extension associated with the station or attendant originating the call. It appears only when authorization code is entered from the station or attendant console.
CLI / ANI	The calling line identifier or automatic number identification, when available on the incoming message, of the party making the invalid attempt.

## Station Security Code Violations

```
-----
monitor security-violations station-security-codes
-----
```

```
SECURITY VIOLATIONS STATUS
Date: NN:nn DAY MON nn 199n
```

```
STATION SECURITY CODE VIOLATIONS
```

Date	Time	TG No	Mbr	Port/Ext	FAC	Dialed Digits
01/07	08:33	6	2		123	3001#12345678#
01/01	07:32			01A0301	135	3001#87654321#
01/03	14:22	3	6		124	#5551234#
12/25	16:45			88888	127	980765432112345

### Screen 5-6. Station Security Code Violations Report

The following fields are displayed on the Station Security Code Violations report.

**Table 5-6. Station Security Code Violations Report**

Field	Description
Date	The date that the attempt occurred.
Time	The time that the attempt occurred.
TG No	The trunk group number associated with the trunk where the attempt originated.
Mbr	The trunk group member number associated with the trunk where the attempt originated.
Port/Ext	The port or extension associated with the station or attendant originating the call.
FAC	The feature access code dialed that required a station security code.
Dialed Digits	The digits that the caller dialed when making this invalid attempt. This may allow judgement as to whether the caller was actually trying to break in to the system, or was a legitimate user making typographical mistakes.

## Recent Change History Report

# 6

---

This chapter describes the Recent Change History Report. The user can view or print a history report of the most recent administration and maintenance changes. The history report also lists each time a user logs in or off the system. This report is used for diagnostic, information, or security purposes.

The system maintains a log in a software buffer of the most recent administration and maintenance commands. This log is called the transaction log. Commands must be data affecting and successfully entered to save in the transaction log. The data-affecting commands are called data commands.

The transaction log displays or prints as a history report when the user enters the **list history** or **list history print** command at the management terminal, or a remote terminal. The report generates by any login with display administration and maintenance-data permissions.

### Data Commands

With the exception of login and logoff, only those administration and maintenance commands that change the data state associated with any object and qualifier are maintained in the transaction log. The commands that change data are called data commands.

For example, the **change station 3600** command changes the state of the translation data and so is classified as a data command and entered in the log. However, the command **display station 3600** does not change the state of the translation data and is not entered in the log.

The following commands are classified as data commands and are saved in the transaction log:

- add, change, remove, duplicate
- backup
- busyout, release
- cancel
- clear
- configure
- enable, disable
- format
- login/logoff
- mark
- recycle
- refresh
- restart
- save
- set, reset
- start
- test
- upgrade
- wp (write physical)

The following commands are *not* classified as data commands and are *not* saved in the transaction log:

- copy
- download
- get
- list, display, status
- load, restore
- monitor
- rp (read physical)
- upload

## Transaction Log and History Report

Associated data is saved in the transaction log for every data command. This data includes:

- Date, time
- Port, login
- Action, object, qualifier

You can display or print a history report of transaction log data by entering the **list history** or **list history print** command. Data commands display or print in last in, first out order.

An example of a recent change history report is shown in [Screen 6-1](#).

HISTORY						
Date	Time	Port	Date of Login	Loaded Actn	Translation: Object	9:53pm Wed Jul 13, 1994 Qualifier
07/18	12:34	EPN	scust	logf		
07/18	12:23	EPN	cust	cha	dialplan	
07/16	09:44	EPN	ncust	rel	station	504
07/16	09:22	EPN	ncust	busy	station	504
07/15	15:25	EPN	cust	cha	station	507
07/15	15:19	NET	cust	cha	system-param	features
07/15	15:18	NET	inads	dup	station	20001 start 30001 call count 8
07/15	15:16	EPN	cust	add	station	507
07/15	15:15	EPN	ncust	logn		
07/15	15:09	NET	cust	add	station	505
07/15	15:06	NET	cust	cha	station	504
07/15	15:04	EPN	cust	add	station	504
07/15	15:02	NET	cust	add	station	503
07/15	15:01	NET	cust	add	station	502
07/15	14:56	NET	cust	add	station	501
07/15	14:23	EPN	cust	cha	dialplan	

Screen 6-1. Transaction Log

[Table 6-1](#) contains a brief description of the report entries.

**Table 6-1. History report field descriptions**

Field	Description
Date of Loaded Translation	The time and date that the translation is saved on tape. When a translation is saved on tape, by entering the <b>save translation</b> command, the time and date of the save is logged on the tape. Whenever the system is cold started or rebooted, the transaction log is loaded from the tape and the time and date are included on the History Report, for example, "9:53 pm Wed Jul 13, 1994."
Date	The date the data command was entered, for example, <b>07/18</b> .
Time	The time the data command was entered, for example, <b>12:34</b> .
Port	The port, or group of ports, the user was connected to. Users are grouped as follows: <ul style="list-style-type: none"><li>■ Release 5vs/si Port Types<ul style="list-style-type: none"><li>— MGR1 - direct system access port connection</li><li>— INADS - dial up port</li><li>— EPN - Expansion Port Network connection</li><li>— NET - Network Controller incoming/outgoing system access port</li></ul></li><li>■ Release 5r Port Types<ul style="list-style-type: none"><li>— SYSAM-LCL - direct system access port connection</li><li>— SYSAM-RMT - dial up port</li><li>— MAINT - EPN maintenance board RS-232 connection</li><li>— SYS-PORT - incoming/outgoing system access port</li></ul></li></ul>
Login	The system login of the user entering the <b>data</b> command; for example, <b>cust</b> .
Action	The first command word entered; specifies the operation to be performed.
Object	The second command word or words entered; specifies the object to be acted on, for example <b>station, trunk group</b> .
Qualifier	The third command word or words entered; one or more words or digits used to further identify or complete the object; for example, <b>1120</b> (the station number).

# Blank Worksheets



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Worksheets serve as the suggested means for collecting data for historical comparison purposes. Refer to ["Data Analysis Guidelines"](#) for the corresponding measurements report to obtain information on how to use these forms. Make as many copies of these forms as you need for your data collection and analysis.

**WORKSHEET 1**

**ATTENDANT GROUP DATA WORKSHEET**

**System ID:** \_\_\_\_\_ **Location:** \_\_\_\_\_  
**Group Size:** \_\_\_\_\_

Day of Week	Report Type*	Meas Hour	Calls Ans	Calls Aband	Calls Queued	Calls H-Abd	Calls Held	Time Avail	Time Talk	Time Held	Time Abd	Speed of Answer	Week No. and Date
M													
T													
W													
T													
F													
S													
S													
M													
T													
W													
T													
F													
S													
S													
M													
T													
W													
T													
F													
S													
S													
M													
T													
W													
T													
F													
S													
S													

\* Report Type: LH for last hour, TP for today's peak, or YP for yesterday's peak.

## WORKSHEET 2

### ARS/AAR ROUTING PATTERN DATA WORKSHEET

System ID:		Location:				Report Type = Yesterday *							
Route-Pattern No:		Queue Size:											
Day of Week	Total Calls Offered	Calls Carried	Calls Blocked	Calls Queued	Queue Overflow	% of Calls Carried						Week No. and Date	
						Pref 1	Pref 2	Pref 3	Pref 4	Pref 5	Pref 6		
M													
T													
W													
T													
F													
S													
S													
M													
T													
W													
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T													
F													
S													
S													
M													
T													
W													
T													
F													
S													
S													

\* Use "Yesterday's report" for the full day route-pattern measurement.

### WORKSHEET 3

#### HUNT GROUP DATA WORKSHEET

System ID: \_\_\_\_\_ Location: \_\_\_\_\_ Group Name: \_\_\_\_\_  
 Group ID: \_\_\_\_\_ Group Size: \_\_\_\_\_ Group Type: \_\_\_\_\_  
 Queue Size: \_\_\_\_\_

Day of Week	Report Type*	Meas Hour	Total Usage	Calls Answered	Calls Abandoned	Calls Queued	Speed of Answer	Week No. and Date
M								
T								
W								
T								
F								
S								
S								
M								
T								
W								
T								
F								
S								
S								
M								
T								
W								
T								
F								
S								
S								
M								
T								
W								
T								
F								
S								
S								

\* Report Type: LH for last hour, TP for today's peak, or YP for yesterday's peak

**WORKSHEET 4**

**TRUNK GROUP DATA WORKSHEET**

System ID:				Location:				Group Type:					
Group No:				Group Size:				Group Dir:					
				Queue Size:									
Day of Week	Report Type*	Meas Hour	Total Usage	Total Seize	Inc. Seize	Grp Ovfl	Calls Qued	Que Ovfl	Que Abd	Out Serv	% ATB	% Out Blk	Week No. and Date
M													
T													
W													
T													
F													
S													
S													
M													
T													
W													
T													
F													
S													
S													
M													
T													
W													
T													
F													
S													
S													
M													
T													
W													
T													
F													
S													
S													

\* Report Type: LH for last hour, TP for today's peak, or YP for yesterday's peak

**WORKSHEET 5**

**WIDEBAND TRUNK GROUP DATA WORKSHEET**

<b>System ID:</b>		<b>Location:</b>							<b>Service Type:</b>	
<b>Group No:</b>		<b>Group Size:</b>							<b>Group Dir:</b>	
Day of Week	Report Type*	Meas Hour	Total Usage	Total Seize	Inc. Seize	Grp Ovfl	Out Serv	% ATB	% Out Blk	Week No. and Date
M										
T										
W										
T										
F										
S										
S										
M										
T										
W										
T										
F										
S										
S										
M										
T										
W										
T										
F										
S										
S										
M										
T										
W										
T										
F										
S										
S										

\* Report Type: LH for last hour, TP for today's peak, or YP for yesterday's peak

## WORKSHEET 6

### PROCESSOR OCCUPANCY SUMMARY DATA WORKSHEET

System ID:		Location:											Week No. and Date
Day of Week	Peak Hour	Stat Occ	CP Occ	SM Occ	Idle Occ	Total Calls	Tandem Calls	Total ATMPT	INTCOM ATMPT	INC ATMPT	OUT ATMPT	PNET ATMPT	
M													
T													
W													
T													
F													
S													
S													
M													
T													
W													
T													
F													
S													
S													
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T													
F													
S													
S													
M													
T													
W													
T													
F													
S													
S													
4 Week Avg	NA												

“NA” means that the field () should not be calculated. It is not applicable.

## WORKSHEET 7 1 of 10

The Call Center Operations worksheet allows Lucent Technologies personnel to assess the status and capacity of your DEFINITY Generic 3r switch. The information collected helps Lucent Technologies determine the impact of the proposed configuration on your switch.

The worksheet contains four general sections: General Business, Incoming Call Management (for example, ACD), Outgoing Call Management, and Call Flows. The general business section provides the general business (non ICM/OCM) call traffic mix expected for the switch. The Incoming Call Management (ICM) section provides general information about inbound telemarketing operations. The Outgoing Call Management (OCM) section provides general information about outbound telemarketing operations. The Call Flows section provides a list of important items to include in the customer call flows and several examples of appropriate call flows.

The accuracy of the information provided determines whether realistic and achievable switch capacity estimates can be obtained. Therefore, it is **STRONGLY** recommended that the information provided is as accurate as possible and be reviewed by the customer and the appropriate Lucent Technologies representative.

### General Business

1. Indicate how much of the general business traffic (non-ICM/OCM) in your system fits into each of the following categories. Use percentages. The five categories must add to 100%.

<b>Traffic Type</b>	<b>Percentage</b>
Intercom	_____
Incoming	_____
Outgoing	_____
Private Network (ETN, UDP, DCS)	_____
General Business Vectoring (Note)	_____
Total	100%

**NOTE:** General Business Vectoring applies to incoming calls that use Call Vectoring and terminate to destinations other than ACD splits.

**WORKSHEET 7 2 of 10**

2. Indicate the call characteristics for each of the categories above. Again, each category (intercom, incoming, outgoing, private networking) must add to 100%.

Intercom	Answered	_____
	Coverage (Note 1)	_____
	Auto Call Back	_____
	Total	100%
Incoming	DID Answered	_____
	DID Coverage (Note 1)	_____
	Attendant Answered (Note 2)	_____
	Attendant Extended (Note 3)	_____
	Total	100%
Outgoing	DOD 7/8 Digit Calls	_____
	DOD 10/11 Digit Calls	_____
	Total	100%
Private Networking	Incoming Answered	_____
	Incoming Coverage (Note 1)	_____
	Outgoing	_____
	Tandem	_____
	Total	100%

**Notes:**

- Coverage means that the call goes to coverage without being answered at the original destination.
  - Attendant answered means that an attendant answers a call, handles the caller's request and disconnects.
  - Attendant extended means that an attendant answers a call and extends the call to a station that answers.
3. For the general business traffic (non ICM/OCM), specify the percentage (%) of calls that fit into the following categories. Percentages do not need to add up to 100%.

DCS Calls on Private Network	_____
ISDN-PRI on Private Network	_____
ISDN-PRI on Incoming Calls	_____
ISDN-PRI on Outgoing Calls	_____
ISDN-PRI on General Business Vectoring	_____

- Specify the number of CDR ports used (maximum 2) \_\_\_\_\_
- Specify the percentage of calls on Intra-Switch CDR \_\_\_\_\_

## WORKSHEET 7 3 of 10

6. Specify the percentage of total business traffic that terminates and originates at each of the following types of stations. Percentages must add up to 100%.

Analog Stations	_____
DCP Non-display	_____
DCP with Display	_____
ISDN BRI	_____
Total	100%

7. For the general business traffic indicate how coverage calls are handled. The total of the percentages below cannot exceed 100%.

- Specify the percentage of all coverage calls that go to AUDIX™ Voice Messaging System. \_\_\_\_\_
- Specify the percentage of all coverage calls that go to an ASAI Messaging Service that sets the Message Waiting Indicator (Set Value - Message Waiting Indicator) \_\_\_\_\_

8. Specify the percentage of general business calls that involve an ASAI monitored/controlled station (3rd Party Domain Control) \_\_\_\_\_
9. Specify the percentage of the domain controlled calls (from 8 above) that are initiated via ASAI (3rd Party Auto Dial) \_\_\_\_\_
10. Provide the appropriate call flow for call vectoring, if any, as specified in the Call Flow Section.

### Incoming Call Management (ICM)

1. Specify the percentage of your system's inbound ICM traffic that fits into the following categories:

ICM Calls using ISDN PRI facilities	_____
ICM Calls using CDR	_____

2. Indicate in minutes per hour the expected agent efficiency (that is, in a typical hour how many minutes is an agent active on ACD Calls or available to receive ACD Calls?) \_\_\_\_\_

**NOTE:** Agents in After Call (ACW) and Auxiliary (AUX) work modes are not available to receive calls.

## WORKSHEET 7 4 of 10

3. Specify the maximum number of inbound ACD agents (exclude Voice Response Unit ports) on the system \_\_\_\_\_

4. Specify the percentages of ICM traffic that terminates at each of the following station types (this is not the administered number of ACD stations, but the actual station mix used to answer calls). Percentages must add up to 100%.

Analog Stations	_____
DCP Non-display	_____
DCP with Display	_____
ISDN BRI	_____
Total	100%

5. Provide the appropriate call flows as specified in the Call Flow Section.

### Outgoing Call Management (OCM)

1. Specify the percentage of your system's outbound OCM traffic that fits into the following categories:

OCM Calls using ISDN trunks	_____
OCM Calls using CDR	_____

2. Specify the average number of rings for calls that are never answered \_\_\_\_\_
3. Specify the average number of rings for calls that are answered \_\_\_\_\_
4. Indicate in minutes per hour the expected agent efficiency (that is, in a typical hour how many minutes is an agent active on outbound calls or available to initiate outbound OCM calls?) \_\_\_\_\_

**NOTE:** Agents in After Call (ACW) and Auxiliary (AUX) work modes are not available to receive calls.

5. Specify the maximum number of outbound ACD agents (exclude Voice Response Unit ports) on the system \_\_\_\_\_

**WORKSHEET 7 5 of 10**

6. Specify the station type mix (in percentages) used by active ACD agents (this is not the administered number but the actual mix used by agents in the outbound calling). Percentages must add up to 100%.

Analog Stations	_____
DCP Non-display	_____
DCP with Display	_____
ISDN BRI	_____
Total	100%

7. Is CMS/BCMS used to monitor and measure the outbound ACD calls? \_\_\_\_\_
8. Provide the appropriate call flows as specified in the Call Flow Section.

**Call Flows**

Using Figures A-1, A-2, A-3, and A-4 as examples, specify a call flow, complete with percentages, that best depicts the call operations during the busy hour. As a minimum, call flows should be provided for general business call vectoring, Incoming Call Management, and Outgoing Call Management areas. If there are several different call flows within each area, draw a call flow for each and give the percentages of the overall traffic that each call flow represents. Table A-1 shows the most important items to include in the call flow for each of the call categories: General Business (Call Vectoring), ICM, and OCM.

**Table A-1. Items to Include in Call Flow Diagrams**

Items	General Business		
	Call Vectoring	ICM	OCM
Call Vectoring Commands Executed	X	X	
— Announcement	X	X	
— Wait	X	X	
— Collect Digit	X	X	
— Total Digits Collected	X	X	
— Available Agent Conditional Checks		X	
— Conditional Checks (Goto, Route to, and Check Backup) other than Available Agents	X	X	
— Unconditional Route to	X	X	
— Successful Queue Commands		X	
— Messaging (AUDIX Messaging System only)	X	X	
— ASAI Adjunct Routing		X	
— Look Ahead Interflow Successes		X	
— Look Ahead Interflow Failures		X	

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**Table A-1. Items to Include in Call Flow Diagrams (Continued)**

Items	General Business Call Vectoring	ICM	OCM
ACD Split Actions		X	X
— Announcements (Forced First/Recurring)		X	X
— Queued		X	X
— Intraflow		X	
— Voice Response Unit (VRU) Transfers		X	
— AUDIX as Automated Attendant		X	
CallVisor Related Actions		X	X
— ISDN Gateway (IG) Event Reporting		X	
— ASAI Event Reporting (Event Notification)		X	
— ASAI Transfers/Conferences (3rd Party Merge)		X	X
— ASAI Change Work Modes (Request Feature)		X	X
— ASAI Queries for Agents, Splits, & Trunk Status			X
— ASAI Call Termination (3rd Party Drop/Clear Call)		X	X
— User/Switch Classified 3rd Party Make Calls			X
Other	X	X	X
— Call Holding Time Per Agent		X	X
— VRU Usage		X	X
— Call Transfers/Conferences		X	X
— Digits Dialed (7 or 10 Digits)			X
— Call Classification Outcomes			X
— Coverage Usage	X		
— Attendant Extended Calls	X		

Information sources for developing an accurate call flow can be obtained from:

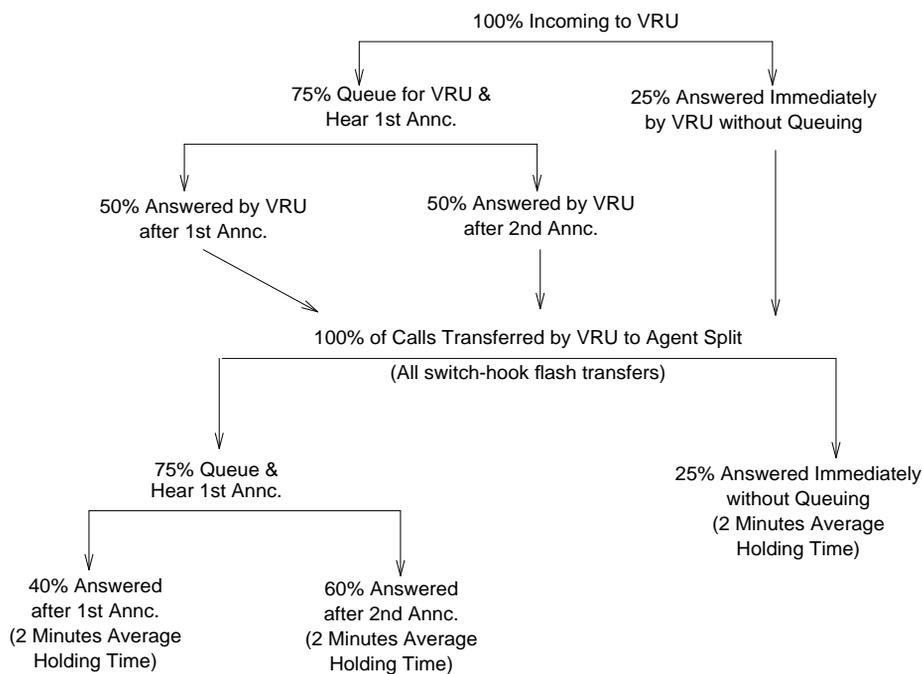
1. BCMS Historical Reports — Daily and Hourly Split and System Reports.
2. CMS Historical Reports — Split and System Reports.
3. Hunt Group Measurements Report.

**WORKSHEET 7 7 of 10**

**Calls to VRU Transferred to Agent Split**

This call flow includes:

- CMS Reporting
- CallVisor ASAI Event Reporting on All Splits (VRU and Agent Splits)
- Non-ISDN Trunks
- CONVERSANT® VIS, VRU
- VRU Transfers via Switch-Hook Flashes.



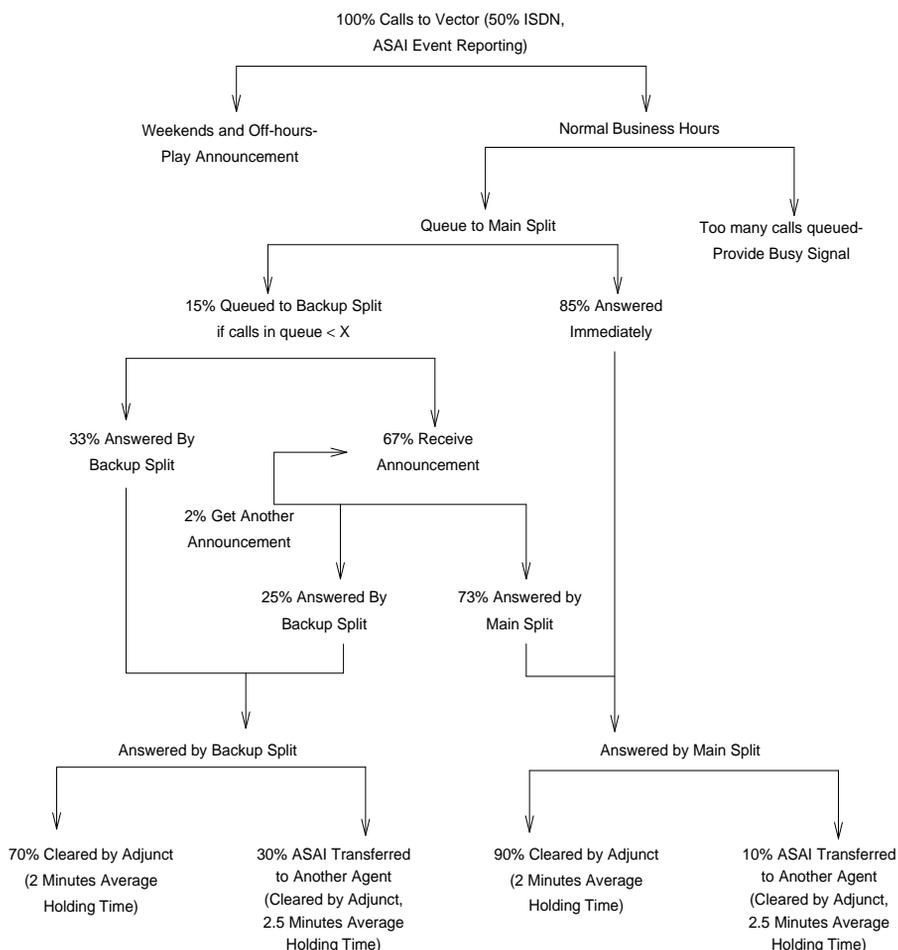
**Figure A-1. Sample ACD — ICM Call Flow**

**WORKSHEET 7 8 of 10**

**Calls to Vector Application — Call Vector Not Defined**

The following call flow presents a call vectoring application before the call vector has been defined. The following items are used with the call flow.

- All calls provide ASAI Event Reporting
- 50% of the calls use ISDN trunks
- All transfers are done manually by the agents at their voice terminals
- A performance objective of no more that 0.2% of the calls would listen to a second announcement while in queue and no calls should receive busy signal.



**Figure A-2. Sample Call Vectoring Call Flow**

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### Calls to Vector Application - Call Vector Defined

The following call flow presents a call vectoring application after the call vector has been defined. The sample call vector below is used:

1. Goto Step 3 if time-of-day is sat 00:00 to sun 23:59
2. Goto Step 5 if time-of-day is all 6:30 to all 16:45
3. Wait 2 secs hearing ringback
4. Disconnect after announcement extension 7000
5. Goto Step 13 if calls-queued in split 7 is >9 priority top
6. Queue to main split 7 priority top
7. Check backup split 9 priority top if available-agents >0
8. Wait time 4 secs hearing ringback
9. Announcement 7010
10. Wait time 30 secs hearing music
11. Announcement 7020
12. Goto Step 10 if unconditionally
13. Busy

Note that since the busy hour is being analyzed, all calls get to Step 5. In addition we know that 90% of the calls are answered in 10 seconds or less and that the remaining 10% of the calls are answered within 30 seconds or less.

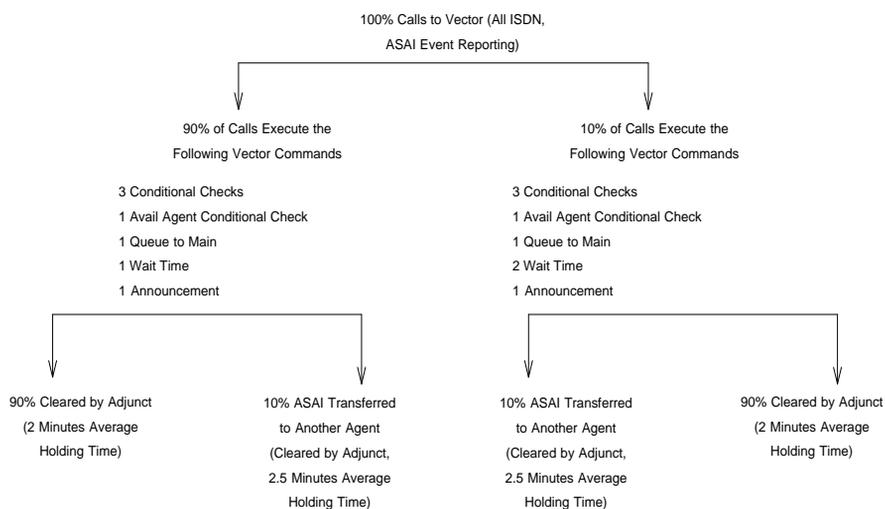


Figure A-3. Sample ICM Call Vectoring Call Flow

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### ASAI Switch Classified Calls

The ASAI adjunct originates all calls via the 3rd Party Make Call capability and uses the switch's call classifier board.

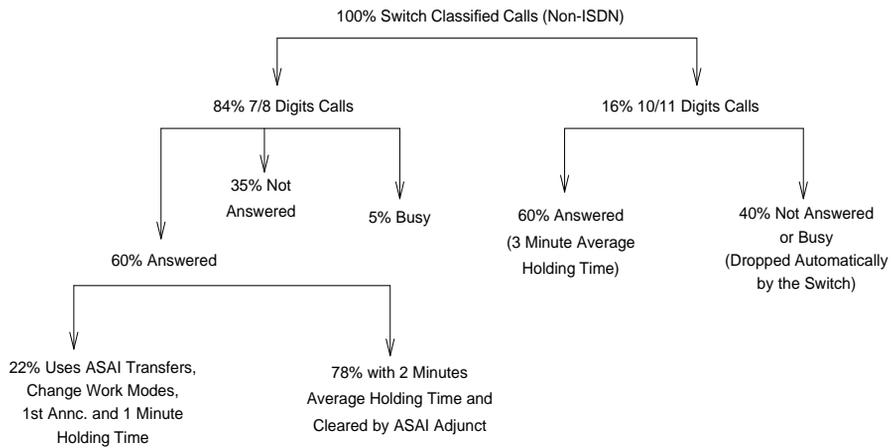


Figure A-4. Sample OCM Call Flow



## References

# B

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This section contains a list of user documents for the DEFINITY Enterprise Communications Server (ECS) Release 5.4.

To order these or other DEFINITY documents, contact the Lucent Technologies Publications Center at the address and phone number on the back of the title page of this document. A complete list of Business Communications Systems (BCS) documents, including previous issues of the documents listed here, is provided in *BCS Publications Catalog*, 555-000-010.

## **Basic DEFINITY ECS Documents**

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These are the basic documents issued for DEFINITY ECS Release 5.4.

### ***DEFINITY Enterprise Communications Server Release 5 — Overview, Issue 3, 555-230-024***

Provides a detailed overview of the ECS including descriptions of many of the major features, applications, hardware, system capabilities, and the support provided with the system. This document is available in the following languages: English, German (DE), Dutch (NL), Brazilian Portuguese (PTB), European French (FR), Colombian Spanish (SPL), and Japanese (JA). To order, append the language suffix to the document number; for example, 555-230-894DE for German. No suffix is needed for the English version.

### ***DEFINITY Enterprise Communications Server Release 5.4 — Change Description, Issue 1, 555-230-472.***

Gives a high-level overview of the DEFINITY ECS Release 5.4. Describes the hardware and software enhancements and lists the problem corrections for this release.

***DEFINITY Enterprise Communications Server Release 5 — System Description Pocket Reference, Issue 1, 555-230-207***

Provides hardware descriptions, system parameters, listings of features and system configurations, and environmental and maintenance requirements. This compact reference combines and replaces Release 5 *System Description and Specifications* and Release 5 *Pocket Reference*.

***DEFINITY Enterprise Communications Server Release 5 — Administration and Feature Description, Issue 1, 555-230-522***

Provides descriptions of system features. Also provides step-by-step procedures for preparing the screens that are required to implement the features, functions, and services of the system. Includes the applications and benefits, feature interactions, administration requirements, hardware requirements, and procedures for voice terminal, data module, and trunk group administration.

This document combines and replaces Release 5 *Feature Description* and Release 5 *Implementation*.

***DEFINITY Enterprise Communications Server Release 5 — Implementation Blank Forms, Issue 1, 555-230-303***

Provides blank hardcopy forms corresponding to the screens that are required to implement the features, functions, and services of the system.

***DEFINITY Enterprise Communications Server Release 5 — System Monitoring and Reporting, Issue 4, 555-230-511***

Provides detailed descriptions of the measurement, status, security, and recent change history reports available in the system and is intended for administrators who validate traffic reports and evaluate system performance. Includes corrective actions for potential problems. Issue 2 of this document was titled *Traffic Reports*.

***DEFINITY Enterprise Communications Server Release 5 — Installation and Test for Single-Carrier Cabinets, Issue 3, 555-230-894***

Provides procedures and information for hardware installation and initial testing of single-carrier cabinets.

This document is available in the following languages: English, German (DE), Dutch (NL), Brazilian Portuguese (PTB), European French (FR), Castillian Spanish (SP), and Japanese (JA). To order, append the language suffix to the document number; for example, 555-230-894DE for German. No suffix is needed for the English version.

***DEFINITY Enterprise Communications Server Release 5 — Installation and Test for Multi-Carrier Cabinets, Issue 2, 555-230-112***

Provides procedures and information for hardware installation and initial testing of multi-carrier cabinets.

***DEFINITY Communications System Generic 3vs and Generic 3si —  
Upgrades and Additions, Issue 1, 555-230-108***

Provides procedures for an installation technician to convert an existing DEFINITY Communications System earlier than Generic 3 Version 4 to Generic 3vs/si Version 4.

***DEFINITY Communications System Generic 3r — Upgrades and Additions,  
Issue 1, 555-230-109***

Provides procedures for an installation technician to convert an existing DEFINITY Communications System earlier than Generic 3 Version 4 to Generic 3r Version 4.

***DEFINITY Enterprise Communications Server Release 5 — Upgrades and  
Additions for R5r, Issue 2, 555-230-121***

Provides procedures for an installation technician to convert an existing Generic 3 Version 4 DEFINITY Communications System to DEFINITY ECS and from DEFINITY ECS Release 5 to DEFINITY ECS Release 5.4.

Included are upgrade considerations, lists of required hardware, and step-by-step upgrade procedures. Also included are procedures to add control carriers, switch node carriers, port carriers, circuit packs, auxiliary cabinets, and other equipment.

***DEFINITY Enterprise Communications Server Release 5 — Upgrades and  
Additions for R5vs/si, Issue 2, 555-230-120***

Provides procedures for an installation technician to convert an existing DEFINITY Communications System Generic 3 Version 4 to DEFINITY ECS and from DEFINITY ECS Release 5 to DEFINITY ECS Release 5.4.

Included are upgrade considerations, lists of required hardware, and step-by-step upgrade procedures. Also included are procedures to add control carriers, switch node carriers, port carriers, circuit packs, auxiliary cabinets, and other equipment.

***DEFINITY Enterprise Communications Server Release 5 — Maintenance and  
Test for R5r, Issue 1, 555-230-122***

Provides detailed descriptions of the procedures for monitoring, testing, and maintaining the ECS. Included are maintenance commands, step-by-step trouble-clearing procedures, the procedures for using all tests, and explanations of the system's error codes.

***DEFINITY Enterprise Communications Server Release 5 — Maintenance and Test for R5vs/si, Issue 1, 555-204-123***

Provides detailed descriptions of the procedures for monitoring, testing, and maintaining the ECS. Included are maintenance commands, step-by-step trouble-clearing procedures, the procedures for using all tests, and explanations of the system's error codes.

***DEFINITY Communications System Generic 3 Planning and Configuration, Issue 2, 555-230-601***

Provides step-by-step procedures for the account team in determining the customer's equipment and hardware requirements to configure a system according to the customer specifications. Includes detailed requirements and block diagrams. This document reflects Generic 3 Version 2 software, but still contains relevant information for the ECS.

***BCS Products Security Handbook, Issue 5, 555-025-600***

Provides information about the risks of telecommunications fraud and measures for addressing those risks and preventing unauthorized use of BCS products. This document is intended for telecommunications managers, console operators, and security organizations within companies.

***DEFINITY Enterprise Communications Server Release 5 — Terminals and Adjuncts Reference, Issue 8, 555-015-201***

Provides descriptions of the peripheral equipment that can be used with System 75, System 85, DEFINITY Communications System, and DEFINITY ECS. This document is intended for customers and Lucent Technologies account teams for selecting the correct peripherals to accompany an ECS.

***DEFINITY Enterprise Communications Server — Generic 1, Generic 3, System 75, and Voice Terminal Guide Builder, Issue 3, 555-230-755***

Provides capability to produce laser-printed documentation for specific voice terminals. The software is supported by a comprehensive user's guide and on-line help. This product requires a 386 PC, minimum of 6MB disk space, minimum of 4MB RAM, a printer supported by Microsoft GDI printer drive, and Microsoft Windows 3.1 or higher. A mouse is recommended.

## Call Center

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These documents are issued for Call-Center applications of the DEFINITY ECS.

### DEFINITY

#### ***DEFINITY Enterprise Communications Server Release 5 — Call Vectoring/EAS Guide, Issue 1, 585-230-521***

Provides information on how to write, use, and troubleshoot vectors, which are command sequences that process telephone calls in an Automatic Call Distribution (ACD) environment. It is provided in two parts: tutorial and reference.

The tutorial provides step-by-step procedures for writing and implementing basic vectors.

The reference includes detailed descriptions of the call vectoring features, vector management, vector administration, adjunct routing, troubleshooting, and interactions with management information systems (including the Call Management System).

#### ***DEFINITY Enterprise Communications Server Release 5 — Basic Call Management System (BCMS) Operations, Issue 1, 555-230-706***

Provides detailed instructions on how to generate reports and manage the system and is intended for telecommunications managers who wish to use Basic Call Management System (BCMS) reports and system managers responsible for maintaining the system.

### CentreVu CMS

#### ***CentreVu Call Management System Release 3 Version 5 — Administration, Issue 1, 585-215-820***

#### ***CentreVu Call Management System Release 3 Version 5 — Reports, Issue 1, 585-215-821***

#### ***CentreVu Call Management System Release 3 Version 5 — Custom Reports, Issue 1, 585-215-822***

#### ***CentreVu Call Management System Release 3 Version 5 — Upgrades and Migrations, Issue 1, 585-215-826***

#### ***CentreVu Call Management System Release 3 Version 5 — External Call History Reference, Issue 1, 585-215-824***

#### ***CentreVu Call Management System Release 3 Version 5 — Forecast, Issue 1, 585-215-825***

## Application-Specific Documents

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These documents are application-specific.

### ***DEFINITY Enterprise Communications Server Generic 2 to Release 5.4 — Transition Reference, Issue 1, 555-230-523***

Provides information on the differences in features and administration between the old and new systems when upgrading from a Generic 2 system to DEFINITY ECS Release 5.4.

## ASAI

### ***DEFINITY Enterprise Communications Server Release 5 — CallVisor ASAI Planning Guide, Issue 5, 555-230-222***

Provides procedures and directions for the account team and customer personnel for effectively planning and implementing the CallVisor Adjunct/Switch Application Interface (ASAI) PBX-Host environment. The CallVisor ASAI is a communications interface that allows adjunct processors to access switch features and to control switch calls. It is implemented using an Integrated Services Digital Network (ISDN) Basic Rate Interface (BRI). Hardware and software requirements are included.

### ***DEFINITY Enterprise Communications Server Release 5 — CallVisor ASAI Protocol Reference, Issue 6, 555-230-221***

Provides detailed layer 3 protocol information regarding the CallVisor Adjunct/Switch Application Interface (ASAI) for the systems and is intended for the library or driver programmer of an adjunct processor to create the library of commands used by the applications programmers. Describes the ISDN message, facility information elements, and information elements.

### ***DEFINITY Enterprise Communications Server Release 5 — CallVisor ASAI Technical Reference, Issue 6, 555-230-220***

Provides detailed information regarding the CallVisor Adjunct/Switch Application Interface (ASAI) for the systems and is intended for the application designer responsible for building and/or programming custom applications and features.

### ***DEFINITY Enterprise Communications Server Release 5 — Installation, Administration, and Maintenance of CallVisor ASAI Over the DEFINITY LAN Gateway, Issue 2, 555-230-223***

Provides procedures for installation, administration, and maintenance of the CallVisor Adjunct/Switch Application Interface (ASAI) Ethernet application over the DEFINITY LAN Gateway and is intended for system administrators, telecommunications managers, Management Information System (MIS) managers, LAN managers, and Lucent personnel. The ASAI-Ethernet application

provides ASAI functionality using 10Base-T Ethernet rather than BRI as a transport media.

***DEFINITY Enterprise Communications Server Release 5 — Call Visor ASAI Overview, Issue 2, 555-230-225***

Provides a general description of Call Visor ASAI.

This document is available in the following languages: English, German (DE), Dutch (NL), Brazilian Portuguese (PTB), European French (FR), Colombian Spanish (SPL), and Japanese (JA). To order, append the language suffix to the document number; for example, 555-230-894DE for German. No suffix is needed for the English version.

***DEFINITY Enterprise Communications Server Release 5 — CallVisor PC ASAI Installation and Reference, Issue 4, 555-246-205***

Provides procedural and reference information for installers, Tier 3 support personnel, and application designers.

## ACD

***DEFINITY Enterprise Communications Server Release 5 — Automatic Call Distribution (ACD) Agent Instructions, Issue 5, 555-230-722***

Provides information for use by agents after they have completed ACD training. Includes descriptions of ACD features and the procedures for using them.

***DEFINITY Enterprise Communications Server Release 5 — Automatic Call Distribution (ACD) Supervisor Instructions, Issue 4, 555-230-724***

Provides information for use by supervisors after they have completed ACD training. Includes descriptions of ACD features and the procedures for using them.

## Call Detail Recording

***Call Detail Acquisition & Processing Reference, 555-006-202***

Contains call detail recording information.

## Console Operations

***DEFINITY Communications System Generic 1 and Generic 3 Console Operations, Issue 2, 555-230-700***

Provides operating instructions for the attendant console. Included are descriptions of the console control keys and functions, call-handling procedures, basic system troubleshooting information, and routine maintenance procedures.

***DEFINITY Enterprise Communications Server Release 5 — Console  
Operations Quick Reference, Issue 2, 555-230-890***

Provides operating instructions for the attendant console. Included are descriptions of the console control keys and functions, call handling, basic system-troubleshooting information, and routine maintenance procedures.

This document is available in the following languages: English, German (DE), Dutch (NL), Brazilian Portuguese (PTB), European French (FR), Colombian Spanish (SPL), and Japanese (JA). To order, append the language suffix to the document number; for example, 555-230-894DE for German. No suffix is needed for the English version.

## **Hospitality**

***An Introduction to DEFINITY Communications System Generic 3 Hospitality  
Services, Issue 1, 555-230-021***

Provides an overview of the features available for use by the lodging and health industries to improve their property management and to provide assistance to their employees and clients. Included are brief definitions of many of the system features, descriptions of the hardware, planning considerations, and list of the system capabilities.

***DEFINITY Communications System Generic 1 and Generic 3 Hospitality  
Operations, Issue 3, 555-230-723***

Provides step-by-step procedures for using the features available for the lodging and health industries to improve their property management and to provide assistance to their employees and clients. Includes detailed descriptions of reports.

# Glossary and Abbreviations

## Numerics

### 3B2 Message Server

A software application that combines voice and data messaging services for voice-terminal users whose extensions are connected to a system.

### 800 service

A service in the United States that allows incoming calls from certain areas to an assigned number for a flat-rate charge based on usage.

## A

### AA

Archangel. See [angel](#).

### AAC

ATM access concentrator

### AAR

See [Automatic Alternate Routing \(AAR\)](#).

### abandoned call

An incoming call in which the caller hangs up before the call is answered.

### Abbreviated Dialing (AD)

A feature that allows callers to place calls by dialing just one or two digits.

### AC

1. Alternating current.
2. See [Administered Connection \(AC\)](#).

### AAR

Automatic Alternate Routing

### ACA

See [Automatic Circuit Assurance \(ACA\)](#).

### ACB

See [Automatic Callback \(ACB\)](#).

### ACD

See [Automatic Call Distribution \(ACD\)](#).

### ACD agent

See [agent](#).

### ACU

See [Automatic calling unit \(ACU\)](#)

### ACW

See [after-call work \(ACW\) mode](#).

### access code

A 1-, 2-, or 3-digit dial code used to activate or cancel a feature, or access an outgoing trunk.

**access endpoint**

Either a nonsignaling channel on a DS1 interface or a nonsignaling port on an analog tie-trunk circuit pack that is assigned a unique extension.

**access tie trunk**

A trunk that connects a main communications system with a tandem communications system in an electronic tandem network (ETN). An access tie trunk can also be used to connect a system or tandem to a serving office or service node. Also called access trunk.

**access trunk**

See [access tie trunk](#).

**ACCUNET**

A trademarked name for a family of digital services offered by AT&T in the United States.

**ACD**

See [Automatic Call Distribution \(ACD\)](#). ACD also refers to a work state in which an agent is on an ACD call.

**ACD work mode**

See [work mode](#).

**active-notification association**

A link that is initiated by an adjunct, allowing it to receive event reports for a specific switch entity, such as an outgoing call.

**active-notification call**

A call for which event reports are sent over an active-notification association (communication channel) to the adjunct. Sometimes referred to as a monitored call.

**active notification domain**

VDN or ACD split extension for which event notification has been requested.

**ACU**

See [Automatic calling unit \(ACU\)](#).

**AD**

See [Abbreviated Dialing \(AD\)](#).

**ADAP**

AUDIX Data Acquisition Package

**ADC**

See [analog-to-digital converter \(ADC\)](#).

**adjunct**

A processor that does one or more tasks for another processor and that is optional in the configuration of the other processor. See also [application](#).

**adjunct-control association**

A relationship initiated by an application via *Third Party Make Call*, the *Third Party Take Control*, or *Domain (Station) Control* capabilities to set up calls and control calls already in progress.

**adjunct-controlled call**

Call that can be controlled using an adjunct-control association. Call must have been originated via *Third Party Make Call* or *Domain (Station) Control* capabilities or must have been taken control of via *Third Party Take Control* or *Domain (Station) Control* capabilities.

**adjunct-controlled split**

An ACD split that is administered to be under adjunct control. Agents logged into such splits must do all telephony work, ACD login/ logout, and changes of work mode through the adjunct (except for auto-available adjunct-controlled splits, whose agents may not log in/out or change work mode).

**adjunct-monitored call**

An adjunct-controlled call, active-notification call, or call that provides event reporting over a domain-control association.

**Adjunct-Switch Application Interface (ASAI)**

A recommendation for interfacing adjuncts and communications systems, based on the CCITT Q.932 specification for layer 3.

**ADM**

Asynchronous data module

**administer**

To access and change parameters associated with the services or features of a system.

**Administered Connection (AC)**

A feature that allows the switch to automatically establish and maintain end-to-end connections between access endpoints (trunks) and/or data endpoints (data modules).

**administration group**

See [capability group](#).

**administration terminal**

A terminal that is used to administer and maintain a system. See also [terminal](#).

**Administration Without Hardware (AWOH)**

A feature that allows administration of ports without associated terminals or other hardware.

**ADU**

See [asynchronous data unit \(ADU\)](#).

**AE**

See [access endpoint](#).

**after-call work (ACW) mode**

A mode in which agents are unavailable to receive ACD calls. Agents enter the ACW mode to perform ACD-related activities such as filling out a form after an ACD call.

**AG**

ASAI Gateway

**agent**

A person who receives calls directed to a split. A member of an ACD hunt group or ACD split. Also called an ACD agent.

**agent report**

A report that provides historical traffic information for internally measured agents.

**AIM**

Asynchronous interface module

**AIOD**

Automatic Identification of Outward Dialing

**ALBO**

Automatic Line Build Out

**All trunks busy (ATB)**

The state in which no trunks are available for call handling.

**ALM-ACK**

Alarm acknowledge

**American Standard Code for Information Interchange**

See [ASCII \(American Standard Code for Information Interchange\)](#).

**AMW**

Automatic Message Waiting

**AN**

Analog

**analog**

The representation of information by continuously variable physical quantities such as amplitude, frequency, and phase. See also [digital](#).

**analog data**

Data that is transmitted over a digital facility in analog (PCM) form. The data must pass through a modem either at both ends or at a modem pool at the distant end.

**analog telephone**

A telephone that receives acoustic voice signals and sends analog electrical signals along the telephone line. Analog telephones are usually served by a single wire pair (tip and ring). The model-2500 telephone set is a typical example of an analog telephone.

**analog-to-digital converter (ADC)**

A device that converts an analog signal to digital form. See also [digital-to-analog converter \(DAC\)](#).

**angel**

A microprocessor located on each port card in a processor port network (PPN). The angel uses the control-channel message set (CCMS) to manage communications between the port card and the archangel on the controlling switch-processing element (SPE). The angel also monitors the status of other microprocessors on a port card and maintains error counters and thresholds.

**ANI**

See [Automatic Number Identification \(ANI\)](#).

**ANSI**

American National Standards Institute. A United States professional/technical association supporting a variety of standards.

**answerback code**

A number used to respond to a page from a code-calling or loudspeaker-paging system, or to retrieve a parked call.

**AOL**

Attendant-offered load

**AP**

Applications processor

**APLT**

Advanced Private-Line Termination

**appearance**

A software process that is associated with an extension and whose purpose is to supervise a call. An extension can have multiple appearances. Also called call appearance, line appearance, and occurrence. See also [call appearance](#).

**application**

An adjunct that requests and receives ASAI services or capabilities. One or more applications can reside on a single adjunct. However, the switch cannot distinguish among several applications residing on the same adjunct and treats the adjunct, and all resident applications, as a single application. The terms application and adjunct are used interchangeably throughout this document.

**applications processor**

A micro-computer based, program controlled computer providing application services for the DEFINITY switch. The processor is used with several user-controlled applications such as traffic analysis and electronic documentation.

**application service element**

See [capability group](#).

**architecture**

The organizational structure of a system, including hardware and software.

**ARS**

See [Automatic Route Selection \(ARS\)](#).

**ASAI**

See [Adjunct-Switch Application Interface \(ASAI\)](#)

**ASCII (American Standard Code for Information Interchange)**

The standard code for representing characters in digital form. Each character is represented by an 8-bit code (including parity bit).

**association**

A communication channel between adjunct and switch for messaging purposes. An active association is one that applies to an existing call on the switch or to an extension on the call.

**asynchronous data transmission**

A method of transmitting data in which each character is preceded by a start bit and followed by a stop bit, thus permitting data characters to be transmitted at irregular intervals. This type transmission is advantageous when transmission is not regular (characters typed at a keyboard). Also called asynchronous transmission. See also [synchronous data transmission](#).

**asynchronous data unit (ADU)**

A device that allows direct connection between RS-232C equipment and a digital switch.

**asynchronous Transfer Mode (ATM)**

A packet-like switching technology in which data is transmitted in fixed-size (53-byte) cells. ATM provides high-speed access for data communication in LAN, campus, and WAN environments.

**ATB**

See [All trunks busy \(ATB\)](#).

**ATD**

See [Attention dial \(ATD\)](#).

**attendant**

A person at a console who provides personalized service for incoming callers and voice-services users by performing switching and signaling operations. See also [attendant console](#).

## **ATM**

See [asynchronous Transfer Mode \(ATM\)](#).

## **attendant console**

The workstation used by an attendant. The attendant console allows the attendant to originate a call, answer an incoming call, transfer a call to another extension or trunk, put a call on hold, and remove a call from hold. Attendants using the console can also manage and monitor some system operations. Also called console. See also [attendant](#).

## **Attention dial (ATD)**

A command in the Hayes modem command set for asynchronous modems.

## **Audio Information Exchange (AUDIX)**

A fully integrated voice-mail system. Can be used with a variety of communications systems to provide call-history data, such as subscriber identification and reason for redirection.

## **AUDIX**

See [Audio Information Exchange \(AUDIX\)](#).

## **auto-in trunk group**

Trunk group for which the CO processes all of the digits for an incoming call. When a CO seizes a trunk from an auto-in trunk group, the switch automatically connects the trunk to the destination — typically an ACD split where, if no agents are available, the call goes into a queue in which callers are answered in the order in which they arrive.

## **Auto-In Work mode**

One of four agent work modes: the mode in which an agent is ready to process another call as soon as the current call is completed.

## **Automatic Alternate Routing (AAR)**

A feature that routes calls to other than the first-choice route when facilities are unavailable.\*\*\*

## **Automatic Callback (ACB)**

A feature that enables internal callers, upon reaching a busy extension, to have the system automatically connect and ring both parties when the called party becomes available.

## **Automatic Call Distribution (ACD)**

A feature that answers calls, and then, depending on administered instructions, delivers messages appropriate for the caller and routes the call to an agent when one becomes available.

## **Automatic Call Distribution (ACD) split**

A method of routing calls of a similar type among agents in a call center. Also, a group of extensions that are staffed by agents trained to handle a certain type of incoming call.

## **Automatic calling unit (ACU)**

A device that places a telephone call.

## **Automatic Circuit Assurance (ACA)**

A feature that tracks calls of unusual duration to facilitate troubleshooting. A high number of very short calls or a low number of very long calls may signify a faulty trunk.

## **Automatic Number Identification (ANI)**

Representation of the calling number, for display or for further use to access information about the caller. Available with Signaling System 7.

## **automatic restoration**

A service that restores disrupted connections between access endpoints (nonsignaling trunks) and data endpoints (devices that connect the switch to data terminal and/or communications

equipment). Restoration is done within seconds of a service disruption so that critical data applications can remain operational.

**Automatic Route Selection (ARS)**

A feature that allows the system to automatically choose the least-cost way to send a toll call.

**automatic trunk**

A trunk that does not require addressing information because the destination is predetermined. A request for service on the trunk, called a seizure, is sufficient to route the call. The normal destination of an automatic trunk is the communications-system attendant group. Also called automatic incoming trunk and automatic tie trunk.

**AUX**

Auxiliary

**auxiliary equipment**

Equipment used for optional system features, such as Loudspeaker Paging and Music-on-Hold.

**auxiliary trunk**

A trunk used to connect auxiliary equipment, such as radio-paging equipment, to a communications system.

**Aux-Work mode**

A work mode in which agents are unavailable to receive ACD calls. Agents enter Aux-Work mode when involved in non-ACD activities such as taking a break, going to lunch, or placing an outgoing call.

**AVD**

Alternate voice/data

**AWOH**

See [Administration Without Hardware \(AWOH\)](#).

**AWG**

American Wire Gauge

**AWT**

Average work time

**B**

**B8ZS**

Bipolar Eight Zero Substitution.

**bandwidth**

The difference, expressed in hertz, between the defined highest and lowest frequencies in a range.

**barrier code**

A security code used with the Remote Access feature to prevent unauthorized access to the system.

**baud**

A unit of transmission rate equal to the number of signal events per second. See also [bit rate](#) and [bits per second \(bps\)](#).

**BCC**

See [Bearer capability class \(BCC\)](#).

## **BCMS**

Basic Call Management System

## **BCT**

See [business communications terminal \(BCT\)](#).

## **Bearer capability class (BCC)**

Code that identifies the type of a call (for example, voice and different types of data).

Determination of BCC is based on the caller's characteristics for non-ISDN endpoints and on the Bearer Capability and Low-Layer Compatibility Information Elements of an ISDN endpoint. Current BCCs are 0 (voice-grade data and voice), 1 (DMI mode 1, 56 kbps data transmission), 2 (DMI mode 2, synchronous/asynchronous data transmission up to 19.2 kbps) 3 (DMI mode 3, 64 kbps circuit/packet data transmission), 4 (DMI mode 0, 64 kbps synchronous data), 5 (temporary signaling connection, and 6 (wideband call, 128–1984 kbps synchronous data).

## **BER**

Bit error rate

## **BHCC**

Busy-hour call completions

## **bit (binary digit)**

One unit of information in binary notation, having two possible values: 0 or 1.

## **bits per second (bps)**

The number of binary units of information that are transmitted or received per second. See also [baud](#) and [bit rate](#).

## **bit rate**

The speed at which bits are transmitted, usually expressed in bits per second. Also called data rate. See also [baud](#) and [bits per second \(bps\)](#).

## **BLF**

Busy Lamp Field

## **BN**

Billing number

## **BOS**

Bit-oriented signaling

## **BPN**

Billed-party number

## **bps**

See [bits per second \(bps\)](#).

## **bridge (bridging)**

The appearance of a voice terminal's extension at one or more other voice terminals.

## **BRI**

The ISDN Basic Rate Interface specification.

## **bridged appearance**

A call appearance on a voice terminal that matches a call appearance on another voice terminal for the duration of a call.

## **BTU**

British Thermal Unit

**buffer**

1. In hardware, a circuit or component that isolates one electrical circuit from another. Typically, a buffer holds data from one circuit or process until another circuit or process is ready to accept the data.
2. In software, an area of memory that is used for temporary storage.

**bus**

A multiconductor electrical path used to transfer information over a common connection from any of several sources to any of several destinations.

**business communications terminal (BCT)**

A digital data terminal used for business applications. A BCT can function via a data module as a special-purpose terminal for services provided by a processor or as a terminal for data entry and retrieval.

**BX.25**

A version of the CCITT X.25 protocol for data communications. BX.25 adds a fourth level to the standard X.25 interface. This uppermost level combines levels 4, 5, and 6 of the ISO reference model.

**bypass tie trunks**

A 1-way, outgoing tie trunk from a tandem switch to a main switch in an ETN. Bypass tie trunks, provided in limited quantities, are used as a last-choice route when all trunks to another tandem switch are busy. Bypass tie trunks are used only if all applicable intertandem trunks are busy.

**byte**

A sequence of (usually eight) bits processed together.

**C**

**CACR**

Cancellation of Authorization Code Request

**cabinet**

Housing for racks, shelves, or carriers that hold electronic equipment.

**cable**

Physical connection between two pieces of equipment (for example, data terminal and modem) or between a piece of equipment and a termination field.

**cable connector**

A jack (female) or plug (male) on the end of a cable. A cable connector connects wires on a cable to specific leads on telephone or data equipment.

**CAG**

Coverage answer group

**call appearance**

1. For the attendant console, six buttons, labeled a-f, used to originate, receive, and hold calls. Two lights next to the button show the status of the call appearance.
2. For the voice terminal, a button labeled with an extension and used to place outgoing calls, receive incoming calls, or hold calls. Two lights next to the button show the status of the call appearance.

### **call-control capabilities**

Capabilities (*Third Party Selective Hold, Third Party Reconnect, Third Party Merge*) that can be used in either of the Third Party Call Control ASE (cluster) subsets (Call Control and Domain Control).

### **Call Detail Recording (CDR)**

A feature that uses software and hardware to record call data (same as CDRU).

### **Call Detail Recording utility (CDRU)**

Software that collects, stores, optionally filters, and outputs call-detail records.

### **Call Management System (CMS)**

An application, running on an adjunct processor, that collects information from an ACD unit. CMS enables customers to monitor and manage telemarketing centers by generating reports on the status of agents, splits, trunks, trunk groups, vectors, and VDNs, and enables customers to partially administer the ACD feature for a communications system.

### **call-reference value (CRV)**

An identifier present in ISDN messages that associates a related sequence of messages. In ASAI, CRVs distinguish between associations.

### **call vector**

A set of up to 15 vector commands to be performed for an incoming or internal call.

### **callback call**

A call that automatically returns to a voice-terminal user who activated the Automatic Callback or Ringback Queuing feature.

### **call-waiting ringback tone**

A low-pitched tone identical to ringback tone except that the tone decreases in the last 0.2 seconds (in the United States). Call-waiting ringback tone notifies the attendant that the Attendant Call Waiting feature is activate and that the called party is aware of the waiting call. Tones in international countries may sound different.

### **call work code**

A number, up to 16 digits, entered by ACD agents to record the occurrence of customer-defined events (such as account codes, social security numbers, or phone numbers) on ACD calls.

### **CAMA**

Centralized Automatic Message Accounting

### **carrier**

An enclosed shelf containing vertical slots that hold circuit packs.

### **carried load**

The amount of traffic served by traffic-sensitive facilities during a given interval.

### **CARR-POW**

Carrier Port and Power Unit for AC Powered Systems

### **CAS**

Centralized Attendant Service or Call Accounting System

### **CCS or hundred call seconds**

A unit of call traffic. Call traffic for a facility is scanned every 100 seconds. If the facility is busy, it is assumed to have been busy for the entire scan interval. There are 3600 seconds per hour. The Roman numeral for 100 is the capital letter C. The abbreviation for call seconds is CS. Therefore, 100 call seconds is abbreviated CCS. If a facility is busy for an entire hour, then it is said to have been busy for 36 CCS. See also [Erlang](#).

**capability**

A request or indication of an operation. For example, *Third Party Make Call* is a request for setting up a call; *event report* is an indication that an event has occurred.

**capability group**

Set of capabilities, determined by switch administration, that can be requested by an application. Capability groups denote association types. For example, *Call Control* is a type of association that allows certain functions (the ones in the capability group) to be performed over this type of association. Also referred to as administration groups or application service elements (ASEs).

**CA-TSC**

Call-Associated Temporary Signaling Connection

**cause value**

A value is returned in response to requests or in event reports when a denial or unexpected condition occurs. ASAI cause values fall into two coding standards: Coding Standard 0 includes any cause values that are part of AT&T and CCITT ISDN specifications; Coding standard 3 includes any other ASAI cause values. This document uses a notation for cause value where the coding standard for the cause is given first, then a slash, then the cause value. Example: CS0/100 is coding standard 0, cause value 100.

**CBC**

Call-by-call or coupled bonding conductor

**CC**

Country code

**CCIS**

Common-Channel Interoffice Signaling

**CCITT**

CCITT (Comite Consultatif International Telephonique et Telegraphique), now called *International Telecommunications Union* (ITU). See [International Telecommunications Union \(ITU\)](#).

**CCMS**

Control-Channel Message Set

**CCS**

See [CCS or hundred call seconds](#).

**CCSA**

Common-Control Switching Arrangement

**CDM**

Channel-division multiplexing

**CDOS**

Customer-dialed and operator serviced

**CDR**

See [Call Detail Recording \(CDR\)](#).

**CDRP**

Call Detail Record Poller

**CDRR**

Call Detail Recording and Reporting

**CDRU**

See [Call Detail Recording utility \(CDRU\)](#).

## CEM

Channel-expansion multiplexing

## center-stage switch (CSS)

The central interface between the processor port network and expansion port networks in a CSS-connected system.

## central office (CO)

The location housing telephone switching equipment that provides local telephone service and access to toll facilities for long-distance calling.

## central office (CO) codes

The first three digits of a 7-digit public-network telephone number in the United States.

## central office (CO) trunk

A telecommunications channel that provides access from the system to the public network through the local CO.

## CEPT

European Conference of Postal and Telecommunications Rate 1

## channel

1. A circuit-switched call.
2. A communications path for transmitting voice and data.
3. In wideband, all of the time slots (contiguous or noncontiguous) necessary to support a call. Example: an H0-channel uses six 64-kbps time slots.
4. A DS0 on a T1 or E1 facility not specifically associated with a logical circuit-switched call; analogous to a single trunk.

## channel negotiation

The process by which the channel offered in the Channel Identification Information Element (CIIE) in the SETUP message is negotiated to be another channel acceptable to the switch that receives the SETUP message and ultimately to the switch that sent the SETUP. Negotiation is attempted only if the CIIE is encoded as *Preferred*. Channel negotiation is not attempted for wideband calls.

## CI

Clock input

## circuit

1. An arrangement of electrical elements through which electric current flows.
2. A channel or transmission path between two or more points.

## circuit pack

A card on which electrical circuits are printed, and IC chips and electrical components are installed. A circuit pack is installed in a switch carrier.

## CISPR

International Special Committee on Radio Interference

## Class of Restriction (COR)

A feature that allows up to 64 classes of call-origination and call-termination restrictions for voice terminals, voice-terminal groups, data modules, and trunk groups. See also [Class of Service \(COS\)](#).

## Class of Service (COS)

A feature that uses a number to specify if voice-terminal users can activate the Automatic Callback, Call Forwarding All Calls, Data Privacy, or Priority Calling features. See also [Class of Restriction \(COR\)](#).

**cm**  
Centimeter

**CM**  
Connection Manager

**CMDR**  
Centralized Message Detail Recording

**CMS**  
Call Management System

**CO**  
See [central office \(CO\)](#).

**common-control switching arrangement (CCSA)**  
A private telecommunications network using dedicated trunks and a shared switching center for interconnecting company locations.

**communications system**  
The software-controlled processor complex that interprets dialing pulses, tones, and keyboard characters and makes the proper connections both within the system and external to the system. The communications system itself consists of a digital computer, software, storage device, and carriers with special hardware to perform the connections. A communications system provides voice and data communications services, including access to public and private networks, for telephones and data terminals on a customer's premises. See also [switch](#).

**confirmation tone**  
A tone confirming that feature activation, deactivation, or cancellation has been accepted.

**connectivity**  
The connection of disparate devices within a single system.

**console**  
See [attendant console](#).

**contiguous**  
Adjacent DS0s within one T1 or E1 facility or adjacent TDM or fiber time slots. The first and last TDM bus, DS0, or fiber time slots are not considered contiguous (no wraparound). For an E1 facility with a D-channel, DS0s 15 and 17 are considered contiguous.

**control cabinet**  
See [control carrier](#).

**control carrier**  
A carrier in a multicarrier cabinet that contains the SPE circuit packs and, unlike an R5r control carrier, port circuit packs. Also called control cabinet in a single-carrier cabinet. See also [switch-processing element \(SPE\)](#).

**controlled station**  
A station that is monitored and controlled via a domain-control association.

**COR**  
See [Class of Restriction \(COR\)](#).

**COS**  
See [Class of Service \(COS\)](#).

**coverage answer group**

A group of up to eight voice terminals that ring simultaneously when a call is redirected to it by Call Coverage. Any one of the group can answer the call.

**coverage call**

A call that is automatically redirected from the called party's extension to an alternate answering position when certain coverage criteria are met.

**coverage path**

The order in which calls are redirected to alternate answering positions.

**coverage point**

An extension or attendant group, VDN, or ACD split designated as an alternate answering position in a coverage path.

**covering user**

A person at a coverage point who answers a redirected call.

**CP**

Circuit pack

**CPE**

Customer-premises equipment

**CPN**

Called-party number

**CPN/BN**

Calling-party number/billing number

**CPTR**

Call-progress-tone receiver

**CRC**

Cyclical Redundancy Checking

**critical-reliability system**

A system that has the following duplicated items: control carriers, tone clocks, EI circuit packs, and cabling between port networks and center-stage switch in a CSS-connected system. See also [duplicated common control](#), and [duplication](#).

**CSA**

Canadian Safety Association

**CSCC**

Compact single-carrier cabinet

**CSCN**

Center-stage control network

**CSD**

Customer-service document

**CSM**

Centralized System Management

**CSS**

See [center-stage switch \(CSS\)](#).

**CSSO**

Customer Services Support Organization

## CSU

Channel service unit

## CTS

Clear to Send

## CWC

See [call work code](#).

## D

### DAC

1. Dial access code or Direct Agent Calling
2. See [digital-to-analog converter \(DAC\)](#).

### data channel

A communications path between two points used to transmit digital signals.

### data-communications equipment (DCE)

The equipment (usually a modem, data module, or packet assembler/disassembler) on the network side of a communications link that makes the binary serial data from the source or transmitter compatible with the communications channel.

### data link

The configuration of physical facilities enabling end terminals to communicate directly with each other.

### data module

An interconnection device between a BRI or DCP interface of the switch and data terminal equipment or data communications equipment.

### data path

The end-to-end connection used for a data communications link. A data path is the combination of all elements of an interprocessor communication in a DCS.

### data port

A point of access to a computer that uses trunks or lines for transmitting or receiving data.

### data rate

See [bit rate](#).

### data service unit (DSU)

A device that transmits digital data on transmission facilities.

### data terminal

An input/output (I/O) device that has either switched or direct access to a host computer or to a processor interface.

### data terminal equipment (DTE)

Equipment consisting of the endpoints in a connection over a data circuit. In a connection between a data terminal and host, the terminal, the host, and their associated modems or data modules make up the DTE.

## dB

Decibel

## dBA

Decibels in reference to amperes.

**dBmC**

Decibels above reference noise with C filter.

**DC**

Direct current

**DCE**

Data-communications equipment

**D-channel backup**

Type of backup used with Non-Facility Associated Signaling (NFAS). A primary D-channel provides signaling for an NFAS D-channel group (two or more PRI facilities). A second D-channel, on a separate PRI facility of the NFAS D-channel group, is designated as backup for the D-channel. Failure of the primary D-channel causes automatic transfer of call-control signaling to the backup D-channel. The backup becomes the primary D-channel. When the failed channel returns to service, it becomes the backup D-channel.

**DCO**

Digital central office

**DCP**

Digital Communications Protocol

**DCS**

Distributed Communications System

**DDC**

Direct Department Calling

**DDD**

Direct Distance Dialing

**delay-dial trunk**

A trunk that allows dialing directly into a communications system (digits are received as they are dialed).

**denying a request**

Sending a negative acknowledgement (NAK), done by sending an FIE with a *return error* component (and a cause value). It should not be confused with the denial event report that applies to calls.

**designated voice terminal**

The specific voice terminal to which calls, originally directed to a certain extension, are redirected. Commonly used to mean the forwarded-to terminal when Call Forwarding All Calls is active.

**dial-repeating trunks**

A PBX tie trunk that is capable of handling PBX station-signaling information without attendant assistance.

**dial-repeating tie trunk**

A tie trunk that transmits called-party addressing information between two communications systems.

**DID**

Direct Inward Dialing

**digit conversion**

A process used to convert specific dialed numbers into other dialed numbers.

## digital

The representation of information by discrete steps. See also [analog](#).

### digital communications protocol (DCP)

- n A proprietary protocol used to transmit both digitized voice and digitized data over the same communications link. A DCP link is made up of two 64-kbps information (I-) channels and one 8-kbps signaling (S-) channel. Digital Communications Protocol. The DCP protocol supports 2 information-bearing channels, and thus two telephones/data modules. The I1 channel is the DCP channel assigned on the first page of the 8411 station form. The I2 channel is the DCP channel assigned on the analog adjunct page of the 8411 station form or on the data module page.
- n Digital Communications Protocol. The DCP protocol supports 2 information-bearing channels, and thus two telephones/data modules. The I1 channel is the DCP channel assigned on the first page of the 8411 station form. The I2 channel is the DCP channel assigned on the analog adjunct page of the 8411 station form or on the data module page.

### digital data endpoints

In DEFINITY ECS, devices such as the 510D terminal or the 515-type business communications terminal (BCT).

### digital multiplexed interface (DMI)

An interface that provides connectivity between a communications system and a host computer or between two communications systems using DS1 24th-channel signaling. DMI provides 23 64-kbps data channels and 1 common-signaling channel over a twisted-pair connection. DMI is offered through two capabilities: bit-oriented signaling (DMI-BOS) and message-oriented signaling (DMI-MOS).

### digital signal level 0 (DS0)

A single 64-kbps voice channel. A DS0 is a single 64-kbps channel in a T1 or E1 facility and consists of eight bits in a T1 or E1 frame every 125 microseconds.

### digital signal level 1 (DS1)

A single 1.544-Mbps (United States) or 2.048-Mbps (outside the United States) digital signal carried on a T1 transmission facility. A DS1 converter complex consists of a pair, one at each end, of DS1 converter circuit packs and the associated T1/E1 facilities.

### digital terminal data module (DTDM)

An integrated or adjunct data module that shares with a digital telephone the same physical port for connection to a communications system. The function of a DTDM is similar to that of a PDM and MPDM in that it converts RS-232C signals to DCP signals.

### digital-to-analog converter (DAC)

A device that converts data in digital form to the corresponding analog signals. See also [analog-to-digital converter \(ADC\)](#).

### digital transmission

A mode of transmission in which information to be transmitted is first converted to digital form and then transmitted as a serial stream of pulses.

### digital trunk

A circuit that carries digital voice and/or digital data in a telecommunications channel.

## **DIOD**

Direct Inward and Outward Dialing

## **direct agent**

A feature, accessed only via ASAI, that allows a call to be placed in a split queue but routed only to a specific agent in that split. The call receives normal ACD call treatment (for example, announcements) and is measured as an ACD call while ensuring that a particular agent answers.

## **Direct Extension Selection (DXS)**

A feature on an attendant console that allows an attendant direct access to voice terminals by pressing a group-select button and a DXS button.

## **Direct Inward Dialing (DID)**

A feature that allows an incoming call from the public network (not FX or WATS) to reach a specific telephone without attendant assistance.

## **Direct Inward Dialing (DID) trunk**

An incoming trunk used for dialing directly from the public network into a communications system without help from the attendant.

## **disk drive**

An electromechanical device that stores data on and retrieves data from one or more disks.

## **distributed communications system (DCS)**

A network configuration linking two or more communications systems in such a way that selected features appear to operate as if the network were one system.

## **DIVA**

Data In/Voice Answer

## **DLC**

Data line circuit

## **DLDM**

Data-line data module

## **DMI**

Digital-multiplexed interface

## **DND**

Do not disturb

## **DNIS**

Dialed-Number Identification Service

## **DOD**

Direct Outward Dialing

## **domain**

VDNs, ACD splits, and stations. The VDN domain is used for active-notification associations. The ACD-split domain is for active-notification associations and domain-control associations. The station domain is used for the domain-control associations.

## **domain-control association**

A *Third Party Domain Control Request* capability initiates a unique CRV/link number combination, which is referred to as a domain-control association.

## **domain-controlled split**

A split for which *Third Party Domain Control* request has been accepted. A domain-controlled split provides an event report for logout.

**domain-controlled station**

A station for which a *Third\_Party\_Domain\_Control* request has been accepted. A domain-controlled station provides event reports for calls that are alerting, connected, or held at the station.

**domain-controlled station on a call**

A station that is active on a call, and which provides event reports over one or two domain-control associations.

**DOSS**

Delivery Operations Support System

**DOT**

Duplication Option Terminal

**DPM**

Dial Plan Manager

**DPR**

Dual-port RAM

**DS1**

Digital Signal Level 1

**DS1C**

Digital Signal Level-1 protocol C

**DS1 CONV**

Digital Signal Level-1 converter

**DSI**

Digital signal interface

**DSU**

Data service unit

**DTDM**

Digital-terminal data module

**DTE**

Data-terminal equipment

**DTGS**

Direct Trunk Group Select

**DTMF**

Dual-tone multifrequency

**DTS**

Disk-tape system

**duplicated common control**

Two processors ensuring continuous operation of a communications system. While one processor is online, the other functions as a backup. The backup processor goes online periodically or when a problem occurs.

**duplication**

The use of redundant components to improve availability. When a duplicated subsystem fails, its backup redundant system automatically takes over.

**duplication option**

A system option that duplicates the following: control carrier containing the SPE, E1 circuit packs in carriers, fiber-optic cabling between port networks, and center-stage switch in a CSS-connected system.

**DWBS**

DEFINITY Wireless Business System

**DXS**

Direct extension selection

**E**

**E1**

A digital transmission standard that carries traffic at 2.048 Mbps. The E1 facility is divided into 32 channels (DS0s) of 64 kbps information. Channel 0 is reserved for framing and synchronization information. A D-channel occupies channel 16.

**E & M**

Ear and mouth (receive and transmit)

**EA**

Expansion archangel

**EAL**

Expansion archangel link

**ear and mouth (E & M) signaling**

Trunk supervisory signaling, used between two communications systems, whereby signaling information is transferred through 2-state voltage conditions (on the E and M leads) for analog applications and through a single bit for digital applications.

**EEBCDIC**

Extended Binary-Coded Decimal Interexchange Code

**ECC**

Error Correct Code

**ECMA**

European Computer Manufacturers Association

**EPF**

Electronic power feed

**EI**

Expansion interface

**EIA**

Electronic Industries Association

**EIA-232**

A physical interface specified by the EIA. EIA-232 transmits and receives asynchronous data at speeds of up to 19.2 kbps over cable distances of up to 50 feet. EIA-232 replaces RS-232 protocol in some DEFINITY applications.

**electronic tandem network (ETN)**

A tandem tie-trunk network that has automatic call-routing capabilities based on the number dialed and the most preferred route available. Each switch in the network is assigned a unique private network office code (RNX), and each voice terminal is assigned a unique extension.

**Electronics Industries Association (EIA)**

A trade association of the electronics industry that establishes electrical and functional standards.

**emergency transfer**

If a major system failure occurs, automatic transfer is initiated to a group of telephones capable of making outgoing calls. The system operates in this mode until the failure is repaired and the system automatically returns to normal operation. Also called power-failure transfer.

**EMI**

Electromagnetic interference

**end-to-end signaling**

The transmission of touch-tone signals generated by dialing from a voice terminal to remote computer equipment. These digits are sent over the trunk as DTMF digits whether the trunk signaling type is marked as tone or rotary and whether the originating station is tone or rotary. Example: a call to a voice-mail machine or automated-attendant service. A connection is first established over an outgoing trunk. Then additional digits are dialed to transmit information to be processed by the computer equipment.

**enhanced private-switched communications service (EPSCS)**

An analog private telecommunications network based on the No. 5 crossbar and 1A ESS that provides advanced voice and data telecommunications services to companies with many locations.

**EPN**

Expansion-port network

**EPROM**

Erasable programmable read-only memory

**EPSCS**

Enhanced Private Switched Communications Services

**ERL**

Echo return loss

**Erlang**

A unit of traffic intensity, or load, used to express the amount of traffic needed to keep one facility busy for one hour. One Erlang is equal to 36 CCS. See also [CCS or hundred call seconds](#).

**ESF**

Extended superframe format

**ESPA**

European Standard Paging Access

**ETA**

Extended Trunk Access; also Enhanced Terminal Administration

**ETN**

Electronic tandem network

**ETSI**

European Telecommunications Standards Institute

**expansion archangel (EAA)**

A network-control microprocessor located on an expansion interface (EI) port circuit pack in an expansion port network. The EA provides an interface between the EPN and its controlling switch-processing element.

**expansion-archangel link (EAL)**

A link-access function on the D-channel (LAPD) logical link that exists between a switch-processing element and an expansion archangel (EA). The EAL carries control messages from the SPE to the EA and to port circuit packs in an expansion port network.

**expansion control cabinet**

See [expansion control carrier](#).

**expansion control carrier**

A carrier in a multicarrier cabinet that contains extra port circuit packs and a maintenance interface. Also called expansion control cabinet in a single-carrier cabinet.

**expansion interface (EI)**

A port circuit pack in a port network that provides the interface between a PN's TDM bus/ packet bus and a fiber-optic link. The EI carries circuit-switched data, packet-switched data, network control, timing control, and DS1 control. In addition, an EI in an expansion port network communicates with the master maintenance circuit pack to provide the EPN's environmental and alarm status to the switch-processing element.

**expansion port network (EPN)**

A port network (PN) that is connected to the TDM bus and packet bus of a processor port network (PPN). Control is achieved by indirect connection of the EPN to the PPN via a port-network link (PNL). See also [port network \(PN\)](#).

**extension-in**

Extension-In (ExtIn) is the work state agents go into when they answer (receive) a non-ACD call. If the agent is in Manual-In or Auto-In and receives an extension-in call, it is recorded by CMS as an AUX-In call.

**extension-out**

The work state that agents go into when they place (originate) a non-ACD call.

**external measurements**

Those ACD measurements that are made by the External CMS adjunct.

**extension**

A 1- to 5-digit number by which calls are routed through a communications system or, with a Uniform Dial Plan (UDP) or main-satellite dialing plan, through a private network.

**external call**

A connection between a communications system user and a party on the public network or on another communications system in a private network.

**F**

**FAC**

Feature Access Code

**facility**

A telecommunications transmission pathway and associated equipment.

**facility-associated signaling (FAS)**

Signaling for which a D-channel carries signaling only for those channels on the same physical interface.

**FAS**

Facility-associated signaling

**FAT**

Facility access trunk

**FAX**

Facsimile

**FCC**

Federal Communications Commission

**FEAC**

Forced Entry of Account Codes

**feature**

A specifically defined function or service provided by the system.

**feature button**

A labeled button on a telephone or attendant console used to access a specific feature.

**FEP**

Front-end processor

**FIC**

Facility interface codes

**fiber optics**

A technology using materials that transmit ultrawideband electromagnetic light-frequency ranges for high-capacity carrier systems.

**fixed**

A trunk allocation term. In the fixed allocation scheme, the time slots necessary to support a wideband call are contiguous, and the first time slot is constrained to certain starting points.

**flexible**

A trunk allocation term. In the flexible allocation scheme, the time slots of a wideband call can occupy noncontiguous positions within a single T1 or E1 facility.

**floating**

A trunk allocation term. In the floating allocation scheme, the time slots of a wideband call are contiguous, but the position of the first time slot is not fixed.

**FNPA**

Foreign Numbering-Plan Area

**foreign-exchange (FX)**

A CO other than the one providing local access to the public telephone network.

**foreign-exchange trunk**

A telecommunications channel that directly connects the system to a CO other than its local CO.

**foreign numbering-plan area code (FNPAC)**

An area code other than the local area code, that must be dialed to call outside the local geographical area.

**FRL**

Facilities Restriction Level

**FX**

Foreign exchange

**G**

**G3-MA**

Generic 3 Management Applications

**G3-MT**

Generic 3 Management Terminal

**G3r**

Generic 3, RISC (Reduced Instruction Set Computer)

**generalized route selection (GRS)**

An enhancement to Automatic Alternate Routing/Automatic Route Selection (AAR/ARS) that performs routing based on call attributes, such as Bearer Capability Classes (BCCs), in addition to the address and facilities restriction level (FRL), thus facilitating a Uniform Dial Plan (UDP) that is independent of the type of call being placed.

**glare**

The simultaneous seizure of a 2-way trunk by two communications systems, resulting in a standoff.

**GM**

Group manager

**GPTR**

General-purpose tone receiver

**grade of service**

The number of call attempts that fail to receive service immediately. Grade of service is also expressed as the quantity of all calls that are blocked or delayed.

**ground-start trunk**

A trunk on which, for outgoing calls, the system transmits a request for services to a distant switching system by grounding the trunk ring lead. To receive the digits of the called number, that system grounds the trunk tip lead. When the system detects this ground, the digits are sent.

**GRS**

Generalized Route Selection

**H**

**H0**

An ISDN information transfer rate for 384-kbps data defined by CCITT and ANSI standards.

**H11**

An ISDN information transfer rate for 1536-kbps data defined by CCITT and ANSI standards.

**H12**

An ISDN information transfer rate for 1920-kbps data defined by CCITT and ANSI standards.

**handshaking logic**

A format used to initiate a data connection between two data module devices.

**hertz (Hz)**

A unit of frequency equal to one cycle per second.

**high-reliability system**

A system having the following: two control carriers, duplicate expansion interface (EI) circuit packs in the PPN (in R5r with CSS), and duplicate switch node clock circuit packs in the switch node (SN) carriers. See also [duplicated common control](#), [duplication](#), [duplication option](#), and [critical-reliability system](#).

**HNPA**

See [home numbering-plan area code \(HNPA\)](#).

**holding time**

The total length of time in minutes and seconds that a facility is used during a call.

**home numbering-plan area code (HNPA)**

The local area code. The area code does not have to be dialed to call numbers within the local geographical area.

**hop**

Nondirect communication between two switch communications interfaces (SCI) where the SCI message passes automatically without intermediate processing through one or more intermediate SCIs.

**host computer**

A computer, connected to a network, that processes data from data-entry devices.

**hunt group**

A group of extensions that are assigned the Station Hunting feature so that a call to a busy extension reroutes to an idle extension in the group. See also [ACD work mode](#).

**Hz**

See [hertz \(Hz\)](#).

**I**

**I1**

The first information channel of DCP.

**I2**

The second information channel of DCP.

**I2 Interface**

A proprietary interface used for the DEFINITY Wireless Business System for the radio-controller circuit packs. Each interface provides communication between the radio-controller circuit pack and up to two wireless fixed bases.

**I3 Interface**

A proprietary interface used for the DEFINITY Wireless Business System for the cell antenna units. Each wireless fixed base can communicate to up to four cell antenna units.

**IAS**

Inter-PBX Attendant Service

**ICC**

Intercabinet cable or intercarrier cable

**ICD**

Inbound Call Director

**ICDOS**

International Customer-Dialed Operator Service

**ICHT**

Incoming call-handling table

**ICI**

Incoming call identifier

**ICM**

Inbound Call Management

**IDDD**

International Direct Distance Dialing

**IDF**

Intermediate distribution frame

**IE**

Information element

**immediate-start tie trunk**

A trunk on which, after making a connection with a distant switching system for an outgoing call, the system waits a nominal 65 ms before sending the digits of the called number. This allows time for the distant system to prepare to receive digits. On an incoming call, the system has less than 65 ms to prepare to receive the digits.

**IMT**

Intermachine trunk

**in**

Inch

**INADS**

Initialization and Administration System

**incoming gateway**

A PBX that routes an incoming call on a trunk *not* administered for Supplementary Services Protocol B to a trunk *not* administered for Supplementary Services Protocol B.

**information exchange**

The exchange of data between users of two different systems, such as the switch and a host computer, over a LAN.

**Information Systems Network (ISN)**

A WAN and LAN with an open architecture combining host computers, minicomputers, word processors, storage devices, PCs, high-speed printers, and nonintelligent terminals into a single packet-switching system.

**INS**

ISDN Network Service

**inside call**

A call placed from one telephone to another within the local communications system.

### **Integrated Services Digital Network (ISDN)**

A public or private network that provides end-to-end digital communications for all services to which users have access by a limited set of standard multipurpose user-network interfaces defined by the CCITT. Through internationally accepted standard interfaces, ISDN provides digital circuit-switched or packet-switched communications within the network and links to other ISDNs to provide national and international digital communications. See also [Integrated Services Digital Network Basic Rate Interface \(ISDN-BRI\)](#) and [Integrated Services Digital Network Primary Rate Interface \(ISDN-PRI\)](#).

### **Integrated Services Digital Network Basic Rate Interface (ISDN-BRI)**

The interface between a communications system and terminal that includes two 64-kbps B-channels for transmitting voice or data and one 16-kbps D-channel for transmitting associated B-channel call control and out-of-band signaling information. ISDN-BRI also includes 48 kbps for transmitting framing and D-channel contention information, for a total interface speed of 192 kbps. ISDN-BRI serves ISDN terminals and digital terminals fitted with ISDN terminal adapters. See also [Integrated Services Digital Network \(ISDN\)](#) and [Integrated Services Digital Network Primary Rate Interface \(ISDN-PRI\)](#).

### **Integrated Services Digital Network Primary Rate Interface (ISDN-PRI)**

The interface between multiple communications systems that in North America includes 24 64-kbps channels, corresponding to the North American digital signal level-1 (DS1) standard rate of 1.544 Mbps. The most common arrangement of channels in ISDN-PRI is 23 64-kbps B-channels for transmitting voice and data and 1 64-kbps D-channel for transmitting associated B-channel call control and out-of-band signaling information. With nonfacility-associated signaling (NFAS), ISDN-PRI can include 24 B-channels and no D-channel. See also [Integrated Services Digital Network \(ISDN\)](#) and [Integrated Services Digital Network Basic Rate Interface \(ISDN-BRI\)](#).

### **intercept tone**

An tone that indicates a dialing error or denial of the service requested.

### **interface**

A common boundary between two systems or pieces of equipment.

### **internal call**

A connection between two users within a system.

### **International Telecommunications Union (ITU)**

Formerly known as International Telegraph and Telephone Consultative Committee (CCITT), ITU is an international organization that sets universal standards for data communications, including ISDN. ITU members are from telecommunications companies and organizations around the world. See also [BX.25](#).

### **International Telegraph and Telephone Consultative Committee**

See [International Telecommunications Union \(ITU\)](#).

### **interflow**

The ability for calls to forward to other splits on the same PBX or a different PBX using the Call Forward All Calls feature.

### **intraflow**

The ability for calls to redirect to other splits on the same PBX on a conditional or unconditional basis using call coverage busy, don't answer, or all criteria.

### **internal measurements**

BCMS measurements that are made by the system. ACD measurements that are made external to the system (via External CMS) are referred to as external measurements.

**in-use lamp**

A red light on a multiappearance voice terminal that lights to show which call appearance will be selected when the handset is lifted or which call appearance is active when a user is off-hook.

**INWATS**

Inward Wide Area Telephone Service

**IO**

Information outlet

**ISDN**

See [Integrated Services Digital Network \(ISDN\)](#).

**ISDN Gateway (IG)**

A feature allowing integration of the switch and a host-based telemarketing application via a link to a gateway adjunct. The gateway adjunct is a 3B-based product that notifies the host-based telemarketing application of call events.

**ISDN trunk**

A trunk administered for use with ISDN-PRI. Also called ISDN facility.

**ISDN-PRI terminal adapter**

An interface between endpoint applications and an ISDN PRI facility. ISDN-PRI terminal adapters are currently available from other vendors and are primarily designed for video conferencing applications. Accordingly, currently available terminal adapters adapt the two pairs of video codec data (V.35) and dialing (RS-366) ports to an ISDN PRI facility.

**IS/DTT**

Integrated Services/digital tie trunk

**ISN**

Information Systems Network

**ISO**

International Standards Organization

**ISV**

Independent software vendor

**ITP**

Installation test procedure

**ITU**

International Telecommunications Union

**IXC**

Interexchange carrier code

**K**

**kHz**

Kilohertz

**kbps**

Kilobits per second

**kbyte**

Kilobyte

**kg**  
Kilogram

## L

**LAN**  
Local area network

**LAP-D**  
Link Access Procedure on the D-channel

**LAPD**  
Link Access Procedure data

**LATA**  
Local access and transport area

**lb**  
Pound

**LBO**  
Line buildout

**LDN**  
Listed directory number

**LDS**  
Long-distance service

**LEC**  
Local exchange carrier

**LED**  
See [light-emitting diode \(LED\)](#).

**light-emitting diode (LED)**  
A semiconductor device that produces light when voltage is applied. LEDs provide a visual indication of the operational status of hardware components, the results of maintenance tests, the alarm status of circuit packs, and the activation of telephone features.

**lightwave transceiver**  
Hardware that provides an interface to fiber-optic cable from port circuit packs and DS1 converter circuit packs. Lightwave transceivers convert electrical signals to light signals and vice versa.

**line**  
A transmission path between a communications system or CO switching system and a voice terminal or other terminal.

**line appearance**  
See [appearance](#).

**line buildout**  
A selectable output attenuation is generally required of DTE equipment because T1 circuits require the last span to lose 15–22.5 dB.

**line port**  
Hardware that provides the access point to a communications system for each circuit associated with a telephone or data terminal.

**link**

A transmitter-receiver channel that connects two systems.

**link-access procedure on the D-channel (LAPD)**

A link-layer protocol on the ISDN-BRI and ISDN-PRI data-link layer (level 2). LAPD provides data transfer between two devices, and error and flow control on multiple logical links. LAPD is used for signaling and low-speed packet data (X.25 and mode 3) on the signaling (D-) channel and for mode-3 data communications on a bearer (B-) channel.

**LINL**

Local indirect neighbor link

**local area network (LAN)**

A networking arrangement designed for a limited geographical area. Generally, a LAN is limited in range to a maximum of 6.2 miles and provides high-speed carrier service with low error rates. Common configurations include daisy chain, star (including circuit-switched), ring, and bus.

**logical link**

The communications path between a processor and a BRI terminal.

**loop-start trunk**

A trunk on which, after establishing a connection with a distant switching system for an outgoing call, the system waits for a signal on the loop formed by the trunk leads before sending the digits of the called number.

**LSU**

Local storage unit

**LWC**

Leave Word Calling

**M**

**MAC**

Medium access

**MADU**

Modular asynchronous data unit

**main distribution frame (MDF)**

A device that mounts to the wall inside the system equipment room. The MDF provides a connection point from outside telephone lines to the PBX switch and to the inside telephone stations.

**main-satellite-tributary**

A private network configuration that can either stand alone or access an ETN. A main switch provides interconnection, via tie trunks, with one or more subtending switches, called satellites; all attendant positions for the main/satellite configuration; and access to and from the public network. To a user outside the complex, a main/satellite configuration appears as one switch, with one listed directory number (LDN). A tributary switch is connected to the main switch via tie trunks, but has its own attendant positions and LDN.

**maintenance**

Activities involved in keeping a telecommunications system in proper working condition: the detection and isolation of software and hardware faults, and automatic and manual recovery from these faults.

**management terminal**

The terminal that is used by the system administrator to administer the switch. The terminal may also be used to access the BCMS feature.

**major alarm**

An indication of a failure that has caused critical degradation of service and requires immediate attention. Major alarms are automatically displayed on LEDs on the attendant console and maintenance or alarming circuit pack, logged to the alarm log, and reported to a remote maintenance facility, if applicable.

**Manual-In work mode**

One of four agent work modes: the mode in which an agent is ready to process another call manually. See [Auto-In Work mode](#) for a contrast.

**MAP**

Maintenance action process

**MAPD**

Multiapplication platform for DEFINITY

**MA-UUI**

Message-Associated User-to-User Signaling

**Mbps**

Megabits per second

**M-Bus**

Memory bus

**Mbyte**

Megabyte

**MCC**

Multicarrier cabinet

**MCS**

Message Center Service

**MCT**

Malicious Call Trace

**MCU**

Multipoint control unit

**MDF**

Main distribution frame

**MDM**

Modular data module

**MDR**

Message detail record

**MEM**

Memory

**memory**

A device into which information can be copied and held, and from which information can later be obtained.

**memory shadowing link**

An operating-system condition that provides a method for memory-resident programs to be more quickly accessed, allowing a system to reboot faster.

**message center**

An answering service that supplies agents to and stores messages for later retrieval.

**message center agent**

A member of a message-center hunt group who takes and retrieves messages for voice-terminal users.

**MET**

Multibutton electronic telephone

**MF**

Multifrequency

**MFB**

Multifunction board

**MFC**

Multifrequency code

**MHz**

Megahertz

**MIM**

Management information message

**minor alarm**

An indication of a failure that could affect customer service. Minor alarms are automatically displayed on LEDs on the attendant console and maintenance or alarming circuit pack, sent to the alarm log, and reported to a remote maintenance facility, if applicable.

**MIPS**

Million instructions per second

**MIS**

Management information system

**MISCID**

Miscellaneous identification

**MMCS**

Multimedia Call Server

**MMCH**

Multimedia call handling

**MMI**

Multimedia interface

**MMS**

Material Management Services

**MO**

Maintenance object

**modem**

A device that converts digital data signals to analog signals for transmission over telephone circuits. The analog signals are converted back to the original digital data signals by another modem at the other end of the circuit.

**modem pooling**

A capability that provides shared conversion resources (modems and data modules) for cost-effective access to analog facilities by data terminals. When needed, modem pooling inserts a conversion resource into the path of a data call. Modem pooling serves both outgoing and incoming calls.

**modular processor data module (MPDM)**

A processor data module (PDM) that can be configured to provide several kinds of interfaces (RS-232C, RS-449, and V.35) to customer-provided data terminal equipment (DTE). See also [processor data module \(PDM\)](#).

**modular trunk data module (MTDM)**

A trunk data module that can be configured to provide several kinds of interfaces (RS-232, RS-449, and V.35) to customer-provided data terminal equipment.

**modulator-demodulator**

See [modem](#).

**monitored call**

See [active-notification call](#).

**MOS**

Message-oriented signaling

**MPDM**

Modular processor data module

**MS**

Message server

**ms**

Millisecond

**MS/T**

Main satellite/tributary

**MSA**

Message servicing adjunct

**MSG**

Message service

**MSL**

Material stocking location

**MSM**

Modular System Management

**MSS**

Mass storage system

**MSSNET**

Mass storage/network control

## **MT**

Management terminal

## **MTDM**

Modular trunk data module

## **MTP**

Maintenance tape processor

## **MTT**

Multitasking terminal

## **multiappearance voice terminal**

A terminal equipped with several call-appearance buttons for the same extension, allowing the user to handle more than one call on that same extension at the same time.

## **Multicarrier cabinet**

A structure that holds one to five carriers. See also [single-carrier cabinet](#).

## **Multifrequency Compelled (MFC) Release 2 (R2) signaling**

A signal consisting of two frequency components, such that when a signal is transmitted from a switch, another signal acknowledging the transmitted signal is received by the switch. R2 designates signaling used in the United States and in countries outside the United States.

## **multiplexer**

A device used to combine a number of individual channels into a single common bit stream for transmission.

## **multiplexing**

A process whereby a transmission facility is divided into two or more channels, either by splitting the frequency band into a number of narrower bands or by dividing the transmission channel into successive time slots. See also [time-division multiplexing \(TDM\)](#).

## **multirate**

The new N x DS0 service (see N x DS0).

## **MWL**

Message-waiting lamp

# **N**

## **N+1**

Method of determining redundant backup requirements. Example: if four rectifier modules are required for a DC-powered single-carrier cabinet, a fifth rectifier module is installed for backup.

## **N x DS0**

N x DS0, equivalently referred to as N x 64 kbps, is an emerging standard for wideband calls separate from H0, H11, and H12 ISDN channels. The emerging N x DS0 ISDN multirate circuit mode bearer service will provide circuit-switched calls with data-rate multiples of 64 kbps up to 1536 kbps on a T1 facility or up to 1920 kbps on an E1 facility. In the switch, N x DS0 channels will range up to 1984 kbps using NFAS E1 interfaces.

## **NANP**

North American Numbering Plan

## **narrowband**

A circuit-switched call at a data rate up to and including 64 kbps. All nonwideband switch calls are considered narrowband.

**native terminal support**

A predefined terminal type exists in switch software, eliminating the need to alias the terminal (that is, manually map call appearances and feature buttons onto some other natively supported terminal type).

**NAU**

Network access unit

**NCA/TSC**

Noncall-associated/temporary-signaling connection

**NCOSS**

Network Control Operations Support Center

**NCSO**

National Customer Support Organization

**NEC**

National Engineering Center

**NEMA**

National Electrical Manufacturer's Association

**NETCON**

Network-control circuit pack

**network**

A series of points, nodes, or stations connected by communications channels.

**network-specific facility (NSF)**

An information element in an ISDN-PRI message that specifies which public-network service is used. NSF applies only when Call-by-Call Service Selection is used to access a public-network service.

**network interface**

A common boundary between two systems in an interconnected group of systems.

**NFAS**

See [Nonfacility-associated signaling \(NFAS\)](#).

**NI**

Network interface

**NID**

Network Inward Dialing

**NM**

Network management

**NN**

National number

**node**

A switching or control point for a network. Nodes are either tandem (they receive signals and pass them on) or terminal (they originate or terminate a transmission path).

**Nonfacility-associated signaling (NFAS)**

A method that allows multiple T1 and/or E1 facilities to share a single D-channel to form an ISDN-PRI. If D-channel backup is not used, one facility is configured with a D-channel, and the other facilities that share the D-channel are configured without D-channels. If D-channel backup is

used, two facilities are configured to have D-channels (one D-channel on each facility), and the other facilities that share the D-channels are configured without D-channels.

**NPA**

Numbering-plan area

**NPE**

Network processing element

**NQC**

Number of queued calls

**NSE**

Night-service extension

**NSU**

Network sharing unit

**null modem cable**

Special wiring of an RS-232-C cable such that a computer can talk to another computer (or to a printer) without a modem.

**NXX**

Public-network office code

**O**

**OA**

Operator assisted

**occurrence**

See [appearance](#).

**OCM**

Outbound Call Management

**offered load**

The traffic that would be generated by all the requests for service occurring within a monitored interval, usually one hour.

**ONS**

On-premises station

**OPS**

Off-premises station

**OPX**

Off-premises extension

**OQT**

Oldest queued time

**OSHA**

Occupational Safety and Health Act

**OSI**

Open Systems Interconnect

## OSS

Operations Support System

## OSSI

Operational Support System Interface

## OTDR

Optical time-domain reflectometer

## othersplit

The work state that indicates that an agent is currently active on another split's call, or in ACW for another split.

## OTQ

Outgoing trunk queuing

## outgoing gateway

A PBX that routes an incoming call on a trunk administered for Supplementary Services Protocol B to a trunk *not* administered for Supplementary Services Protocol B.

## P

### PACCON

Packet control

### packet

A group of bits (including a message element, which is the data, and a control information element (IE), which is the header) used in packet switching and transmitted as a discrete unit. In each packet, the message element and control IE are arranged in a specified format. See also [packet bus](#) and [packet switching](#).

### packet bus

A wide-bandwidth bus that transmits packets.

### packet switching

A data-transmission technique whereby user information is segmented and routed in discrete data envelopes called packets, each with its own appended control information, for routing, sequencing, and error checking. Packet switching allows a channel to be occupied only during the transmission of a packet. On completion of the transmission, the channel is made available for the transfer of other packets. See also [BX.25](#) and [packet](#).

### PAD

Packet assembly/disassembly

### paging trunk

A telecommunications channel used to access an amplifier for loudspeaker paging.

### party/extension active on call

A party is on the call if he or she is actually connected to the call (in active talk or in held state). An originator of a call is always a party on the call. Alerting parties, busy parties, and tones are not parties on the call.

### PBX

Private branch exchange

### PC

See [personal computer \(PC\)](#).

**PCM**

See [pulse-code modulation \(PCM\)](#).

**PCOL**

Personal central-office line

**PCOLG**

Personal central-office line group

**PCS**

Permanent switched calls

**PDM**

See [processor data module \(PDM\)](#).

**PDS**

Premises Distribution System

**PE**

Processing element

**PEC**

Price element code

**PEI**

Processor element interchange

**personal computer (PC)**

A personally controllable microcomputer.

**PGATE**

Packet gateway

**PGN**

Partitioned group number

**PI**

Processor interface

**PIB**

Processor interface board

**pickup group**

A group of individuals authorized to answer any call directed to an extension within the group.

**PIDB**

Product image database

**PKTINT**

Packet interface

**PL**

Private line

**PLS**

Premises Lightwave System

**PMS**

Property Management System

**PN**

Port network

**PNA**

Private network access

**POE**

Processor occupancy evaluation

**POP**

Point of presence

**port**

A data- or voice-transmission access point on a device that is used for communicating with other devices.

**port carrier**

A carrier in a multicarrier cabinet or a single-carrier cabinet containing port circuit packs, power units, and service circuits. Also called a port cabinet in a single-carrier cabinet.

**port network (PN)**

A cabinet containing a TDM bus and packet bus to which the following components are connected: port circuit packs, one or two tone-clock circuit packs, a maintenance circuit pack, service circuit packs, and (optionally) up to four expansion interface (EI) circuit packs in DEFINITY ECS. Each PN is controlled either locally or remotely by a switch processing element (SPE). See also [expansion port network \(EPN\)](#) and [processor port network \(PPN\)](#).

**port-network connectivity**

The interconnection of port networks (PNs), regardless of whether the configuration uses direct or switched connectivity.

**PPM**

1. Parts per million
2. Periodic pulse metering

**PPN**

See [processor port network \(PPN\)](#).

**PRI**

See [Primary Rate Interface \(PRI\)](#).

**primary extension**

The main extension associated with the physical voice or data terminal.

**Primary Rate Interface (PRI)**

A standard ISDN frame format that specifies the protocol used between two or more communications systems. PRI runs at 1.544 Mbps and, as used in North America, provides 23 64-kbps B-channels (voice or data) and one 64-kbps D-channel (signaling). The D-channel is the 24th channel of the interface and contains multiplexed signaling information for the other 23 channels.

**PRI endpoint (PE)**

The wideband switching capability introduces PRI endpoints on switch line-side interfaces. A PRI endpoint consists of one or more contiguous B-channels on a line-side T1 or E1 ISDN PRI facility and has an extension. Endpoint applications have call-control capabilities over PRI endpoints.

**principal**

A terminal that has its primary extension bridged on one or more other terminals.

**principal (user)**

A person to whom a telephone is assigned and who has message-center coverage.

**private network**

A network used exclusively for the telecommunications needs of a particular customer.

**private network office code (RNX)**

The first three digits of a 7-digit private network number.

**PROCR**

Processor

**processor carrier**

See [control carrier](#).

**processor data module (PDM)**

A device that provides an RS-232C DCE interface for connecting to data terminals, applications processors (APs), and host computers, and provides a DCP interface for connection to a communications system. See also [modular processor data module \(MPDM\)](#).

**processor port network (PPN)**

A port network controlled by a switch-processing element that is directly connected to that PN's TDM bus and LAN bus. See also [port network \(PN\)](#).

**processor port network (PPN) control carrier**

A carrier containing the maintenance circuit pack, tone/clock circuit pack, and SPE circuit packs for a processor port network (PPN) and, optionally, port circuit packs.

**Property Management System (PMS)**

A stand-alone computer used by lodging and health-services organizations for services such as reservations, housekeeping, and billing.

**protocol**

A set of conventions or rules governing the format and timing of message exchanges to control data movement and correction of errors.

**PSC**

Premises service consultant

**PSDN**

Packet-switch public data network

**PT**

Personal terminal

**PTC**

Positive temperature coefficient

**PTT**

Postal Telephone and Telegraph

**public network**

The network that can be openly accessed by all customers for local and long-distance calling.

**pulse-code modulation (PCM)**

An extension of pulse-amplitude modulation (PAM) in which carrier-signal pulses modulated by an analog signal, such as speech, are quantized and encoded to a digital, usually binary, format.

**Q**

**QPPCN**

Quality Protection Plan Change Notice

**quadrant**

A group of six contiguous DS0s in fixed locations on an ISDN-PRI facility. Note that this term comes from T1 terminology (one-fourth of a T1), but there are five quadrants on an E1 ISDN-PRI facility (30B + D).

**queue**

An ordered sequence of calls waiting to be processed.

**queuing**

The process of holding calls in order of their arrival to await connection to an attendant, to an answering group, or to an idle trunk. Calls are automatically connected in first-in, first-out sequence.

## R

**RAM**

See [random-access memory \(RAM\)](#).

**random-access memory (RAM)**

A storage arrangement whereby information can be retrieved at a speed independent of the location of the stored information.

**RBS**

Robbed-bit signaling

**RC**

Radio controller

**RCL**

Restricted call list

**read-only memory (ROM)**

A storage arrangement primarily for information-retrieval applications.

**recall dial tone**

Tones signalling that the system has completed a function (such as holding a call) and is ready to accept dialing.

**redirection criteria**

Information administered for each voice terminal's coverage path that determines when an incoming call is redirected to coverage.

**Redirection on No Answer**

An optional feature that redirects an unanswered ringing ACD call after an administered number of rings. The call is then redirected back to the agent.

**remote home numbering-plan area code (RHNPA)**

A foreign numbering-plan area code that is treated as a home area code by the Automatic Route Selection (ARS) feature. Calls can be allowed or denied based on the area code and the dialed CO code rather than just the area code. If the call is allowed, the ARS pattern used for the call is determined by these six digits.

**Remote Operations Service Element (ROSE)**

A CCITT and ISO standard that defines a notation and services that support interactions between the various entities that make up a distributed application.

**REN**

Ringer equivalency number

**reorder tone**

A tone to signal that at least one of the facilities, such as a trunk or a digit transmitter, needed for the call was not available.

**report scheduler**

Software that is used in conjunction with the system printer to schedule the days of the week and time of day that the desired reports are to be printed.

**RFP**

Request for proposal

**RHNPA**

See [remote home numbering-plan area code \(RHNPA\)](#).

**RINL**

Remote indirect neighbor link

**RISC**

Reduced-instruction-set computer

**RLT**

Release-link trunk

**RMATS**

Remote Maintenance, Administration, and Traffic System

**RNX**

Route-number index (private network office code)

**ROM**

See [read-only memory \(ROM\)](#).

**RPN**

Routing-plan number

**RS-232C**

A physical interface specified by the Electronic Industries Association (EIA). RS-232C transmits and receives asynchronous data at speeds of up to 19.2 kbps over cable distances of up to 50 feet.

**RS-449**

Recommended Standard 449

**RSC**

Regional Support Center

**ROSE**

See [Remote Operations Service Element \(ROSE\)](#).

**S**

**S1**

The first logical signalling channel of DCP. The channel is used to provide signaling information for DCP's I1 channel.

**S2**

The second logical signaling channel of DCP. The channel is used to provide signaling information for DCP's I2 channel.

**SABM**

Set Asynchronous Balance Mode

**SAC**

Send All Calls

**SAKI**

See [sanity and control interface \(SAKI\)](#).

**sanity and control interface (SAKI)**

A custom VLSI microchip located on each port circuit pack. The SAKI provides address recognition, buffering, and synchronization between the angel and the five control time slots that make up the control channel. The SAKI also scans and collects status information for the angel on its port circuit pack and, when polled, transmits this information to the archangel.

**SAT**

System access terminal

**SCC**

1. See [single-carrier cabinet](#).
2. Serial communications controller

**SCD**

Switch-control driver

**SCI**

Switch communications interface

**SCO**

System control office

**SCOTCH**

Switch Conferencing for TDM Bus in Concentration Highway

**SCSI**

See [small computer system interface \(SCSI\)](#).

**SDDN**

Software-Defined Data Network

**SDI**

Switched Digital International

**SDLC**

Synchronous data-link control

**SDN**

Software-defined network

**SFRL**

Single-frequency return loss

**SID**

Station-identification number

**simplex system**

A system that has no redundant hardware.

**simulated bridged appearance**

The same as a temporary bridged appearance; allows the terminal user (usually the principal) to bridge onto a call that had been answered by another party on his or her behalf.

**single-carrier cabinet**

A combined cabinet and carrier unit that contains one carrier. See also [Multicarrier cabinet](#).

**single-line voice terminal**

A voice terminal served by a single-line tip and ring circuit (models 500, 2500, 7101A, 7103A).

**SIT**

Special-information tones

**small computer system interface (SCSI)**

An ANSI bus standard that provides a high-level command interface between host computers and peripheral devices.

**SMDR**

Station Message Detail Recording, known as Call Detail Recording in DEFINITY ECS.

**SN**

Switch Node

**SNA**

Systems Network Architecture

**SNC**

Switch Node Clock

**SNI**

Switch Node Interface

**SNMP**

Simple Network Management Protocol

**software**

A set of computer programs that perform one or more tasks.

**SPE**

Switch Processing Element

**SPID**

Service Profile Identifier

**split**

See [ACD work mode](#).

**split condition**

A condition whereby a caller is temporarily separated from a connection with an attendant. A split condition automatically occurs when the attendant, active on a call, presses the start button.

**split number**

The split's identity to the switch and BCMS.

**split report**

A report that provides historical traffic information for internally measured splits.

**split (agent) status report**

A report that provides real-time status and measurement data for internally measured agents and the split to which they are assigned.

**SSI**

Standard serial interface

**SSM**

Single-site management

**SSV**

Station service

**ST3**

Stratum 3 clock board

**staffed**

Indicates that an agent position is logged in. A staffed agent functions in one of four work modes: Auto-In, Manual-In, ACW, or AUX-Work.

**STARLAN**

Star-Based Local Area Network

**Station Message Detail Recording (SMDR)**

An obsolete term now called CDR — a switch feature that uses software and hardware to record call data. See [Call Detail Recording \(CDR\)](#).

**standard serial interface (SSI)**

A communications protocol developed for use with 500-type business communications terminals (BCTs) and 400-series printers.

**status lamp**

A green light that shows the status of a call appearance or a feature button by the state of the light (lit, flashing, fluttering, broken flutter, or unlit).

**stroke counts**

A method used by ACD agents to record up to nine customer-defined events per call when CMS is active.

**SVN**

Security-violation notification

**switch**

Any kind of telephone switching system. See also [communications system](#).

**switchhook**

The buttons located under the receiver on a voice terminal.

**switch-node (SN) carrier**

A carrier containing a single switch node, power units, and, optionally, one or two DS1 converter circuit packs. An SN carrier is located in a center-stage switch.

**switch-node (SN) clock**

The circuit pack in an SN carrier that provides clock and maintenance alarm functions and environmental monitors.

**switch-node interface (SNI)**

The basic building block of a switch node. An SNI circuit pack controls the routing of circuit, packet, and control messages.

**switch-node link (SNL)**

The hardware that provides a bridge between two or more switch nodes. The SNL consists of the two SNI circuit packs residing on the switch nodes and the hardware connecting the SNIs. This hardware can include lightwave transceivers that convert the SNI's electrical signals to light signals, the copper wire that connects the SNIs to the lightwave transceivers, a full-duplex fiber-optic cable, DS1 converter circuit cards and DS1 facilities if a company does not have rights to lay cable, and appropriate connectors.

**switch-processing element (SPE)**

A complex of circuit packs (processor, memory, disk controller, and bus-interface cards) mounted in a PPN control carrier. The SPE serves as the control element for that PPN and, optionally, for one or more EPNs.

**SXS**

Step-by-step

**synchronous data transmission**

A method of sending data in which discrete signal elements are sent at a fixed and continuous rate and specified times. See also [association](#).

**SYSAM**

System Access and Administration

**system administrator**

The person who maintains overall customer responsibility for system administration. Generally, all administration functions are performed from the Management Terminal. The switch requires a special login, referred to as the system administrator login, to gain access to system-administration capabilities.

**system printer**

An optional printer that may be used to print scheduled reports via the report scheduler.

**system report**

A report that provides historical traffic information for internally measured splits.

**system-status report**

A report that provides real-time status information for internally measured splits.

**system manager**

A person responsible for specifying and administering features and services for a system.

**system reload**

A process that allows stored data to be written from a tape into the system memory (normally after a power outage).

**T**

**T1**

A digital transmission standard that in North America carries traffic at the DS1 rate of 1.544 Mbps. A T1 facility is divided into 24 channels (DS0s) of 64 kbps. These 24 channels, with an overall digital rate of 1.536 Mbps, and an 8-kbps framing and synchronization channel make up the 1.544-Mbps transmission. When a D-channel is present, it occupies channel 24. T1 facilities are also used in Japan and some Middle-Eastern countries.

**TAAS**

Trunk Answer from Any Station

**TABS**

Telemetry asynchronous block serial

**TAC**

Trunk-access code

**tandem switch**

A switch within an electronic tandem network (ETN) that provides the logic to determine the best route for a network call, possibly modifies the digits outpulsed, and allows or denies certain calls to certain users.

**tandem through**

The switched connection of an incoming trunk to an outgoing trunk without human intervention.

**tandem tie-trunk network (TTTN)**

A private network that interconnects several customer switching systems.

**TC**

Technical consultant

**TCM**

Traveling class mark

**TDM**

See [time-division multiplexing \(TDM\)](#).

**TDR**

Time-of-day routing

**TEG**

Terminating extension group

**terminal**

A device that sends and receives data within a system. See also [administration terminal](#).

**tie trunk**

A telecommunications channel that directly connects two private switching systems.

**time-division multiplex (TDM) bus**

A bus that is time-shared regularly by preallocating short time slots to each transmitter. In a PBX, all port circuits are connected to the TDM bus, permitting any port to send a signal to any other port.

**time-division multiplexing (TDM)**

Multiplexing that divides a transmission channel into successive time slots. See also [multiplexing](#).

**time interval**

The period of time, either one hour or one-half hour, that BCMS measurements are collected for a reports.

**time slice**

See [time interval](#).

**time slot**

64 kbps of digital information structured as eight bits every 125 microseconds. In the switch, a time slot refers to either a DS0 on a T1 or E1 facility or a 64-kbps unit on the TDM bus or fiber connection between port networks.

**time slot sequence integrity**

The situation whereby the N octets of a wideband call that are transmitted in one T1 or E1 frame arrive at the output in the same order that they were introduced.

**to control**

An application can invoke *Third Party Call Control* capabilities using either an adjunct-control or domain-control association.

**to monitor**

An application can receive *event reports* on an active-notification, adjunct-control, or domain-control association.

**TOD**

Time of day

**tone ringer**

A device with a speaker, used in electronic voice terminals to alert the user.

**TOP**

Task-oriented protocol

**trunk**

A dedicated telecommunications channel between two communications systems or COs.

**trunk allocation**

The manner in which trunks are selected to form wideband channels.

**trunk-data module**

A device that connects off-premises private-line trunk facilities and DEFINITY ECS. The trunk-data module converts between the RS-232C and the DCP, and can connect to DDD modems as the DCP member of a modem pool.

**trunk group**

Telecommunications channels assigned as a group for certain functions that can be used interchangeably between two communications systems or COs.

**TSC**

Technical Service Center

**TTI**

Terminal translation initialization

**TTR**

Touch-tone receiver

**TTT**

Terminating trunk transmission

**TTTN**

See [tandem tie-trunk network \(TTTN\)](#).

**TTY**

Teletypewriter

**U**

**UAP**

Usage-allocation plan

**UART**

Universal asynchronous transmitter

**UCD**

Uniform call distribution

**UCL**

Unrestricted call list

**UDP**

See [Uniform Dial Plan \(UDP\)](#).

**UL**

Underwriter Laboratories

**UM**

User manager

**Uniform Dial Plan (UDP)**

A feature that allows a unique 4- or 5-digit number assignment for each terminal in a multiswitch configuration such as a DCS or main-satellite-tributary system.

**UNMA**

Unified Network Management Architecture

**UNP**

Uniform numbering plan

**UPS**

Uninterruptible power supply

**USOP**

User service-order profile

**UUCP**

UNIX-to-UNIX Communications Protocol

**UUI**

User-to-user information

**V**

**VAR**

Value-added reseller

**VDN**

See [vector directory number \(VDN\)](#).

**vector directory number (VDN)**

An extension that provides access to the Vectoring feature on the switch. Vectoring allows a customer to specify the treatment of incoming calls based on the dialed number.

**vector-controlled split**

A hunt group or ACD split administered with the vector field enabled. Access to such a split is possible only by dialing a VDN extension.

**VIS**

Voice Information System

**VLSI**

Very-large-scale integration

**VM**

Voltmeter

**VNI**

Virtual nodepoint identifier

**voice terminal**

A single-line or multiappearance telephone.

## W

**WATS**

See [Wide Area Telecommunications Service \(WATS\)](#).

**WCC**

World-Class Core

**WCR**

World-Class Routing

**WCTD**

World-Class Tone Detection

**WFB**

Wireless fixed base

**Wide Area Telecommunications Service (WATS)**

A service in the United States that allows calls to certain areas for a flat-rate charge based on expected usage.

**wideband**

A circuit-switched call at a data rate greater than 64 kbps. A circuit-switched call on a single T1 or E1 facility with a bandwidth between 128 and 1536 (T1) or 1984 (E1) kbps in multiples of 64 kbps. H0, H11, H12, and N x DS0 calls are wideband.

**wideband access endpoint**

Access endpoints, extended with wideband switching to include wideband access endpoints. A wideband access endpoint consists of one or more contiguous DS0s on a line-side T1 or E1 facility and has an extension. The Administered Connections feature provides call control for calls originating from wideband access endpoints.

**wink-start tie trunk**

A trunk with which, after making a connection with a distant switching system for an outgoing call, the system waits for a momentary signal (wink) before sending the digits of the called number. Similarly, on an incoming call, the system sends the wink signal when ready to receive digits.

**work mode**

One of four states (Auto-In, Manual-In, ACW, AUX-Work) that an ACD agent can be in. Upon logging in, an agent enters AUX-Work mode. To become available to receive ACD calls, the agent enters Auto-In or Manual-In mode. To do work associated with a completed ACD call, an agent enters ACW mode.

**work state**

An ACD agent may be a member of up to three different splits. Each ACD agent continuously exhibits a work state for every split of which it is a member. Valid work states are Avail, Unstaffed, AUX-Work, ACW, ACD (answering an ACD call), ExtIn, ExtOut, and OtherSpl. An agent's work state for a particular split may change for a variety of reasons (example: when a call is answered or abandoned, or the agent changes work modes). The BCMS feature monitors work states and uses this information to provide BCMS reports.

**write operation**

The process of putting information onto a storage medium, such as a hard disk.

**WSA**

Waiting session accept

**WSS**

Wireless Subscriber System

**Z**

**ZCS**

Zero Code Suppression



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