SubMenu

NOKIA

BSS Integration

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Summary of changes

Changes between document issues are cumulative. Therefore, the latest document issue contains all changes made to previous issues.

Changes made between issues 15 and 14

The changes are related to BSC3i.

Chapter BSS Integration overview

Updated references to NetAct documentation.

Chapter ET indexes in BSC3i and in high and low cabinet BSCs

Added information and a figure about BSC3i.

Chapter Creating the A interface

Added new ET types.

Section *Creating the TCSM2*: Added a note about AMR support.

Chapter Synchronising the A interface

Added information about the CL3TG. Added a new printout on CL3TG. Updated information about the control words of CL1TGs and CL3TGs.

Changes made between issues 14 and 13

The document has been revised throughout to comply with the latest documentation standards.

Chapter ET indexes in high and low cabinet BSCs

Figure *ET5C cartridges and ET2E/A indexes* has been altered: the indexes in ET5C-7 have been changed from 152-167 to 224-239 and in ET5C-8 from 168-183 to 240-255.

Chapter Creating the A interface

In section *Creating the TCSM2*, examples 3 and 5 Printout from transcoder ETSI/ANSI, the command syntax has been changed from ZDDT:TCSM,32;ZER and ZDDX:TCSM,32:'RD'; to ZDDX:TCSM,32:"ZRD";. In section *Creating the speech channels*, first chapter, sentence three has been altered to clarify the fact that the circuit is chosen by MSC specifically with conventional hunting.

In section *Connecting the A interface ET*, step 1, two new processes have been added as well the interface of each process. Example 1 has been replaced with a new one.

In section *Creating the SCCP*, step 1, the NPC-command has been corrected.

Chapter *Adding DN2, SSS, DMR and BBM to the service channel*

DN2: the last sentence changed to include the supported baud rates 1200 and 2400. DMR: added a sentence referring to the supported baud rates 1200, 2400, 4800, and 9600.

Chapter *Initialising base stations*

Section *Taking the base station into use*, step 4.1: ZDDS-command added to the ZLE-command.

Chapter Testing BSS integration

References to more detailed test descriptions added.

Changes made between issues 13 and 12

The document has been revised throughout to comply with the latest documentation standards.

ETSI and ANSI combined (ANSI specific information added to this document).

Chapter A interface protocol layers

Figure *The three layers of CCS7/SS7 Signalling between MSC and BSC* updated: ANSI information added.

Chapter A interface configuration with TCSM and TCSM2

Figure *A interface configuration example* updated to apply to both ETSI and ANSI.

Chapter ET indexes in high and low cabinet BSCs

Figure ET5C cartridges and ET2E/A indexes: added ET5C7 and ET5C8.

Chapter Creating the A interface

Section *Creating the transcoder devices* : updated the printouts in examples 2 and 4.

Section *Creating the speech channels*: Added instructions on activating the feature reversed hunting. Parameters of commands RCC, RCA modified.

Chapter Initialising base stations

Added information on UltraSite, MetroSite, InSite base stations.

Chapter Testing BSS Integration

Figure: changed GPA to Protocol Analyzer for G.703 i/f.

Changes made between issues 12 and 11

Chapter Test arrangements

Section References added

Chapter Creation of the A interface, section Connecting A interface ET

Checking of connection with ZWIP command.

ET must restart with ZUSU command.

Chapter Creation of the A interface, section Creation of the TCSM

Syntax of command ZQWA has changed.

Chapter Creation of the A interface, section DN2, SSS, DMR and BBM

Syntax of command ZQWA has changed.

Chapter Creation of the A interface, section Creation of the TCSM2

Note added after ZWGC command.

ET numbers have changed in example printout and commands added.

Chapter Creation of the A interface, section Create signalling links

Parameters of NCC commands modified.

Chapter Creation of the A interface, section Create the local signalling point code

CCITT has changed to ITU-T.

Chapter Creation of the A interface, section Create the signalling route set

Parameters of NRC commands modified.

Chapter Creation of the A interface, section Define SCCP for the BSC's own sp

Parameters of ZNFD commands modified.

Chapter Creation of the A interface, section Define SCCP for the MSC sp

Parameters of ZNFD commands modified.

Chapter Creation of the A interface, section Create circuit group

Section name has changed and first paragraph removed.

Parameters of ZRCC commands modified.

Chapter Creation of the Abis interface, section Connect an ET to the Abis interface

ET must restart with ZUSU command.

Changes made between issues 11 and 9

GSW is not supported in S8 release.

Chapter Creation of the A interface, section Connecting the A interface ET

ET2E default synchronisation values changed.

New ET5C PCM numbers to Figure 7.

Number of ET5C cartridges has increased.

WTI command modified.

BCSU state must be checked before connecting with WUC command.

Chapter Creation of the A interface, section Creation of the TCSM

Information and note on modifying service channel added (WGM command).

Added command WGC to the process of adding TRCU.

Chapter Creation of the A interface, section Creation of the TCSM2

Coordinates added to commands to create transcoder controller plug-in unit, TRCO and to create TR16 plug-in units

Chapter Creation of the A interface, section Creation of the speech channels

GSW instructions removed as GSW not supported in S8.

RCA command added to section on adding circuits to the circuit group in non-multiplexed cases.

Circuit groups are created by using both the ETPCM and CRCT parameters in both multiplexed and non-multiplexed cases.

Chapter Creation of the A interface, section Synchronisation procedure

Section updated.

Chapter Creation of the Abis interface, section Connect and ET to the Abis interface

BCSU state must be checked before connecting with WUC command.

Chapter Base Station initialisation, section DE45/DF45 Nokia Primesite

Added information on modifying the BCF synchronisation.

Chapter Base Station initialisation, section BTS hardware database handling

EVU command can be used for uploading a valid HW database to the BSC.

Chapter Test transactions, section Supervision of transmission

Section name changed from Supervision of TCSM to Supervision of transmission.

Test execution example added.

1 BSS integration overview

BSS Integration instructions are intended to be used during the integration of the TCSM -BSC-BTS system in the final location.

The BSS integration testing can be started when the commissioning of the different network elements has been done.

The purpose of the BSS integration tests is to ensure that the BSC, TCSM, and BTS operate correctly together in the GSM network. When the BSS integration tests have been performed, the base station subsystem can be taken into use.

Creating a connection to the network management system is described in the following documents:

- for BSC, BSC2, and BSC3i: *DCN Integration* in NMS/2000 T12 documentation or *Integrating 2GBSS to NetAct* in NetAct OSS3.1 documentation.

Creating a connection to the SGSN is described in *SGSN Integration* in SGSN documentation. Creating the connection in BSC is described in GPRS handling in BSC in BSC documentation.

Creating a connection to the Cell Broadcast Centre is described in BSC-CBC Integration in BSC documentation.

Any detected fault should be reported with a Nokia problem report and the report should be sent to the Customer Service Centre.

BSS integration procedure

The main phases of the testing are executed in the order presented here. BSS integration consists of the following phases:

1. Creating the A interface
2. Synchronising the A interface
3. Adding DN2, SSS, DMR and BBM to the service channel
4. Creating the Abis interface

5. Creating X.25 or LAN connections. See *DCN Integration* in NMS/2000 T12 documentation (for BSC and BSC2) or *Integrating 2GBSS to NetAct* in NetAct OSS3.1 documentation (for BSC, BSC2 and BSC3i).

6. Initialising base stations

7. Testing BSS integration

Test logs can be filled in during the testing.

2 A interface protocol layers

In the ETSI environment, the A interface is defined in accordance with CCITT#7 Signalling System. In the ANSI environment, the A interface is defined in accordance with ANSI SS7 Signalling System. Three protocol layers are used: the Message Transfer Part (MTP), the Signalling Connection Control Part (SCCP), and the BSS Application Part (BSSAP ; with ETSI) or the Radio System Application Part (RSAP; with ANSI), as shown in figure 1 The three layers of CCS7/SS7 Signalling between MSC and BSC (ETSI).

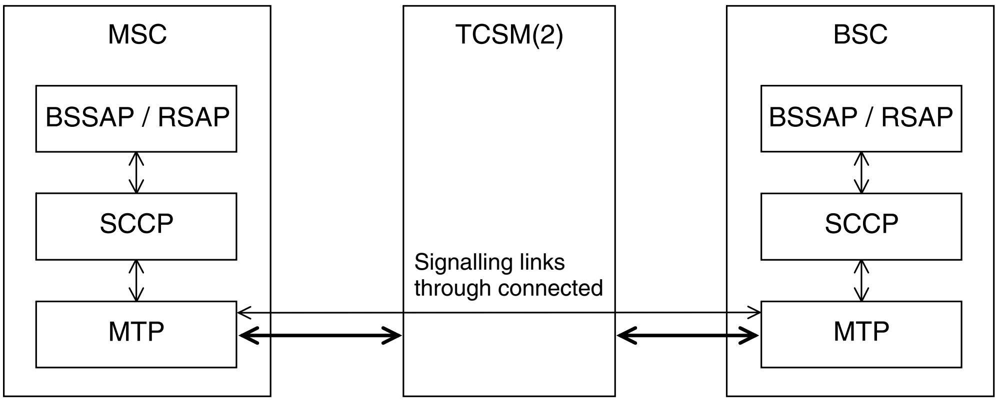

Figure 1. The three layers of CCS7/SS7 Signalling between MSC and BSC

The MTP's task is to provide a reliable means of data transmission. It consists of a signalling link, a signalling link set, and a signalling route set.

The SCCP complements the services of the MTP by providing connectionless and connection-oriented network services. It consists of SCCP subsystems.

The BSSAP/RSAP uses the services of the MTP and the SCCP. It takes care of actual GSM/DCS-related interaction between the MSC and the BSS. Typical tasks of the BSSAP/RSAP are for example call control, location updates, handover management, and paging. It has no counterparts in terms of BSC MMI but is created along with the SCCP.

For more information, refer to BSS integration overview.

3 A interface configuration with TCSM and TCSM2

The A interface configuration can be made in many different ways depending on the equipment, or capacity and redundancy requirements. For example, the transcoder can be either TCSM or TCSM2 (with ANSI, only the TCSM2 is used). Likewise, it is possible to implement only one PCM , E1 (used in ETSI environment) or T1(used in ANSI environment) line between the MSC and the BSC or to use several separate PCM lines for redundancy or capacity purposes.

When the TCSM2 is used, the A interface is always multiplexed. With the TCSM, the A interface can be either multiplexed or not. See figure 2 A interface configuration example.

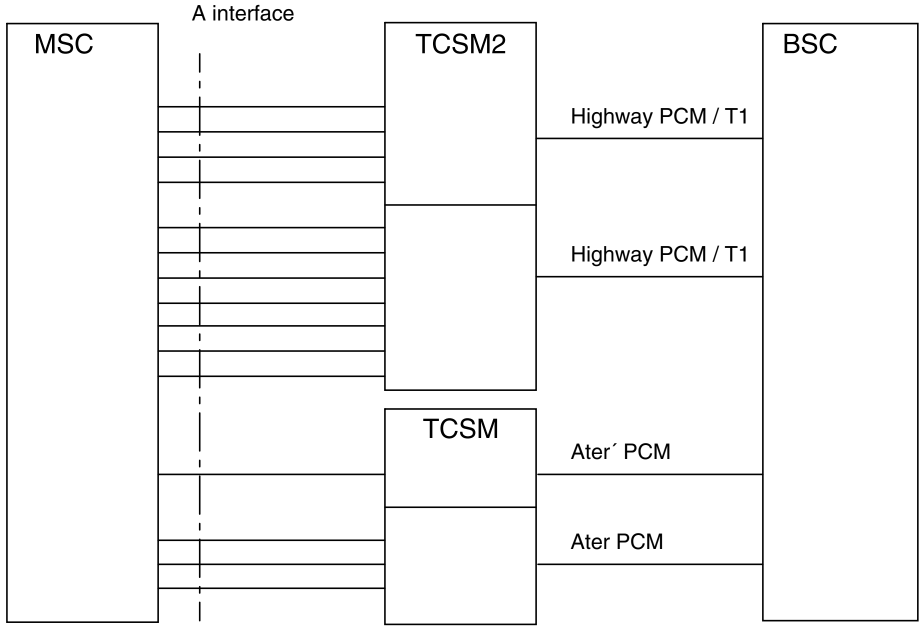

Figure 2. A interface configuration example

TCSM2, ETSI

Provided that the BSC is equipped with an 8 Kbit group switch (GSWB), four separate A interface lines can be put into one highway PCM, making it possible to have up to 120 full-rate speech channels in one highway PCM cable. In half-rate configuration the maximum number of speech channels is 210. The combination of half-rate and full-rate can also be used.

When the TCSM2 is used, the time slots can be allocated more freely than with TCSM. However, the maximum efficiency is achieved if Nokia's recommendation is followed (shown in figure 3 Time slot allocation for full-rate traffic on Ater 2 Mbit/s interface with the TCSM2 (ETSI)).

Signalling channels, and possibly network management system connections, are always allocated beginning from the end of the frame. This optimises the number of the traffic channels available for the fourth tributary. This is due to the fact that only the time slots preceding the first signalling time slot can be used as speech channels in the fourth tributary.

For example, if signalling links are allocated to time slots 31 and 27, only the time slots 25 and 26 are available for the fourth tributary - even if time slots 30, 29, and 28 are not used at all.

BIT->		1 2	3 4	5 6	7 8	
TS->	0	LINK MANAGEMENT				
	1	LAPD	TCH.1	TCH.2	TCH.3	A-PCM 1
	2	TCH.4	TCH.5	TCH.6	TCH.7	
	3	TCH.8	TCH.9	TCH.10	TCH.11	
	4	TCH.12	TCH.13	TCH.14	TCH.15	
	5	TCH.16	TCH.17	TCH.18	TCH.19	
	6	TCH.20	TCH.21	TCH.22	TCH.23	
	7	TCH.24	TCH.25	TCH.26	TCH.27	
	8	TCH.28	TCH.29	TCH.30	TCH.31	
	9	x	TCH.1	TCH.2	TCH.3	A-PCM 2
	10	TCH.4	TCH.5	TCH.6	TCH.7	
	11	TCH.8	TCH.9	TCH.10	TCH.11	
	12	TCH.12	TCH.13	TCH.14	TCH.15	
	13	TCH.16	TCH.17	TCH.18	TCH.19	
	14	TCH.20	TCH.21	TCH.22	TCH.23	
	15	TCH.24	TCH.25	TCH.26	TCH.27	
	16	TCH.28	TCH.29	TCH.30	TCH.31	
	17	x	TCH.1	TCH.2	TCH.3	A-PCM 3
	18	TCH.4	TCH.5	TCH.6	TCH.7	
	19	TCH.8	TCH.9	TCH.10	TCH.11	
	20	TCH.12	TCH.13	TCH.14	TCH.15	
	21	TCH.16	TCH.17	TCH.18	TCH.19	
	22	TCH.20	TCH.21	TCH.22	TCH.23	
	23	TCH.24	TCH.25	TCH.26	TCH.27	
	24	TCH.28	TCH.29	TCH.30	TCH.31	
	25	AUX1: selectable (TCH.1-3)				(A-PCM 4)
	26	AUX2: selectable (TCH.4-7)				
	27	AUX3: selectable (TCH.8-11)				
	28	AUX4: selectable (TCH.12-15)				
	29	#7 signalling (TCH.16-19)				
	30	#7 signalling (TCH.20-23)				
	31	#7 signalling (TCH.24-27)				

Figure 3. Time slot allocation for full-rate traffic on Ater 2 Mbit/s interface with the TCSM2 (ETSI)

TCSM2, ANSI

The A interface is always multiplexed, which means that the A interface T1s are compressed in the transcoder to fit into one highway T1. In this way, four A interface T1s can be put to one highway T1, making it possible to have up to 96 traffic channels between the transcoder and the BSC as shown in figure 4 A interface time slot allocation (ANSI). However, one channel is required for the LAPD channel and normally one 64 kbit time slot is used for SS7 signalling. This leaves 91 channels for traffic.

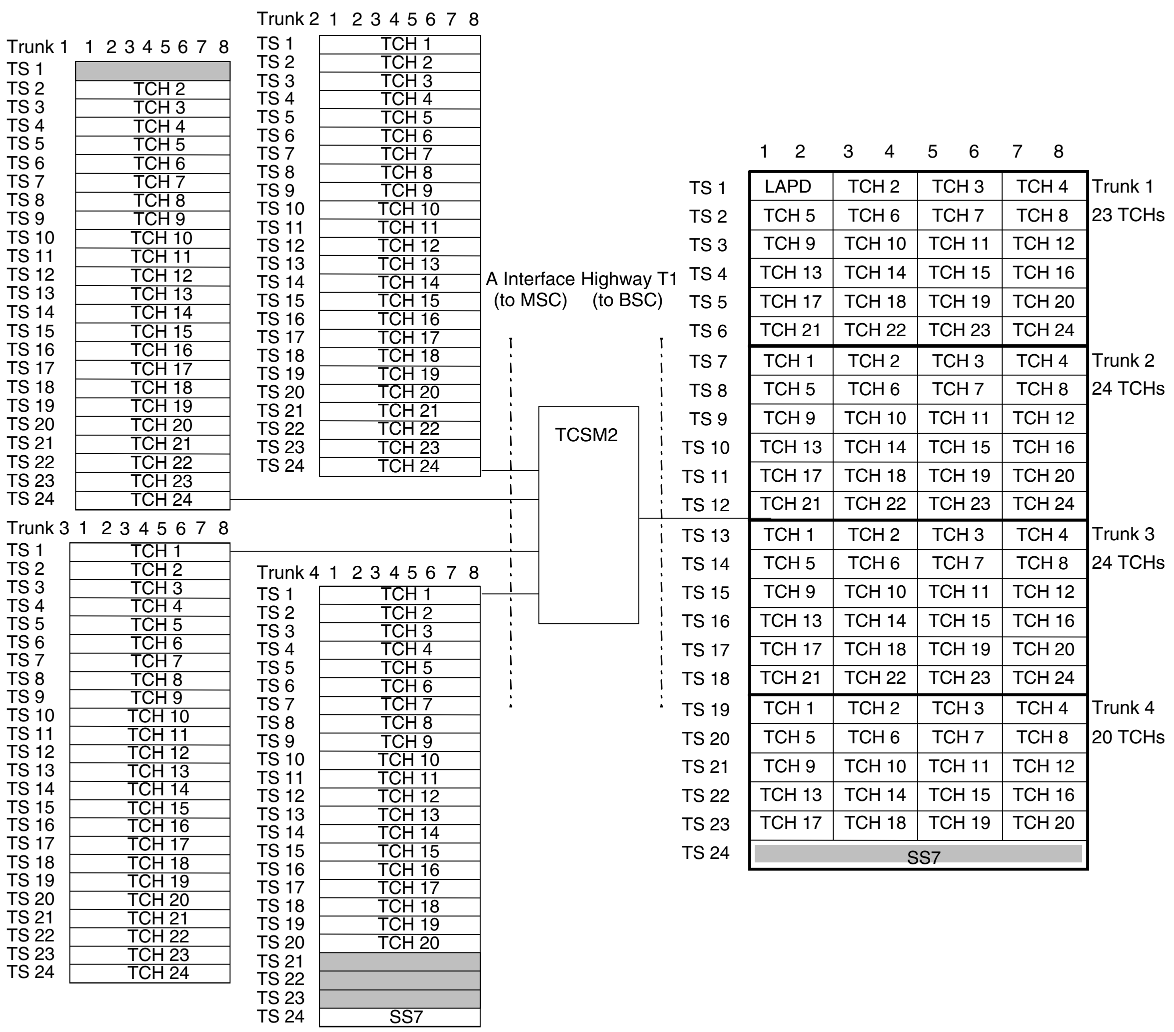

Figure 4. A interface time slot allocation (ANSI)

TCSM (ETSI)

With multiplexing, the PCM line capacity can be used more efficiently by allocating as many as three separate A interface PCMs into one single Ater PCM. In this way, 90 speech channels can be allocated into one PCM cable.

The time slot allocation differs in different A interface configurations. When the TCSM is used without multiplexing, the signalling link is always in time slot 16 (see figure 5 Time slot allocation on Ater interface when submultiplexing is not used). Time slot 16 cannot be used for traffic because the TCSM has no DSP for that time slot. Time slot 31 is used for Q1 .

BIT->		1	2	3	4	5	6	7	8
TS->	0	LINK MANAGEMENT							
	1	TCH.1		not used					
	2	TCH.2		not used					
	3	TCH.3		not used					
	4	TCH.4		not used					
	5	TCH.5		not used					
	6	TCH.6		not used					
	7	TCH.7		not used					
	8	TCH.8		not used					
	9	TCH.9		not used					
	10	TCH.10		not used					
	11	TCH.11		not used					
	12	TCH.12		not used					
	13	TCH.13		not used					
	14	TCH.14		not used					
	15	TCH.15		not used					
	16	#7 signalling							
	17	TCH.17		not used					
	18	TCH.18		not used					
	19	TCH.19		not used					
	20	TCH.20		not used					
	21	TCH.21		not used					
	22	TCH.22		not used					
	23	TCH.23		not used					
	24	TCH.24		not used					
	25	TCH.25		not used					
	26	TCH.26		not used					
	27	TCH.27		not used					
	28	TCH.28		not used					
	29	TCH.29		not used					
	30	TCH.30		not used					
	31	TCH.31/Q1		not used					

Figure 5. Time slot allocation on Ater interface when submultiplexing is not used. TS31 (bits 1 and 2) carry either TCH.31 or Q1 data.

If the A interface is multiplexed with the TCSM, time slots 25, 26 or 27 are used for signalling links (see figure 6 Time slot allocation on Ater 2 Mbit/s interface when submultiplexing is used with TCSM). Time slot 31 is used for Q1 and time slots 28 - 30 can be used for example for digital network management system connections.

BIT->	1 2	3 4	5 6	7 8	
TS-> 0	LINK MANAGEMENT				
1	x	TCH.1	TCH.2	TCH.3	A-PCM 1
2	TCH.4	TCH.5	TCH.6	TCH.7	
3	TCH.8	TCH.9	TCH.10	TCH.11	
4	TCH.12	TCH.13	TCH.14	TCH.15	
5	x	TCH.17	TCH.18	TCH.19	
6	TCH.20	TCH.21	TCH.22	TCH.23	
7	TCH.24	TCH.25	TCH.26	TCH.27	
8	TCH.28	TCH.29	TCH.30	TCH.31	
9	x	TCH.1	TCH.2	TCH.3	A-PCM 2
10	TCH.4	TCH.5	TCH.6	TCH.7	
11	TCH.8	TCH.9	TCH.10	TCH.11	
12	TCH.12	TCH.13	TCH.14	TCH.15	
13	x	TCH.17	TCH.18	TCH.19	
14	TCH.20	TCH.21	TCH.22	TCH.23	
15	TCH.24	TCH.25	TCH.26	TCH.27	
16	TCH.28	TCH.29	TCH.30	TCH.31	
17	x	TCH.1	TCH.2	TCH.3	A-PCM 3
18	TCH.4	TCH.5	TCH.6	TCH.7	
19	TCH.8	TCH.9	TCH.10	TCH.11	
20	TCH.12	TCH.13	TCH.14	TCH.15	
21	x	TCH.17	TCH.18	TCH.19	
22	TCH.20	TCH.21	TCH.22	TCH.23	
23	TCH.24	TCH.25	TCH.26	TCH.27	
24	TCH.28	TCH.29	TCH.30	TCH.31	
25	#7 signalling				
26	#7 signalling				
27	#7 signalling				
28	AUX1: selectable TS				
29	AUX2: selectable TS				
30	AUX3: selectable TS				
31	Q1 (bits 1...8)				

Figure 6. Time slot allocation on Ater 2 Mbit/s interface when submultiplexing is used with TCSM

For more information, refer to BSS integration overview.

4 ET indexes in BSC3i and in high and low cabinet BSCs

BSC3i

BSC3i can have up to two ET4C-B cartridges in basic configuration, each having space for 60–64 2 Mbit ET PCM's plug-in units in ETSI, or 60–64 1.5 Mbit ET PCM's plug-in units in ANSI. This makes it possible to have a maximum of 124 2 Mbit ET PCM's or 124 1.5 Mbit ET PCM's in one BSC; see figure below.

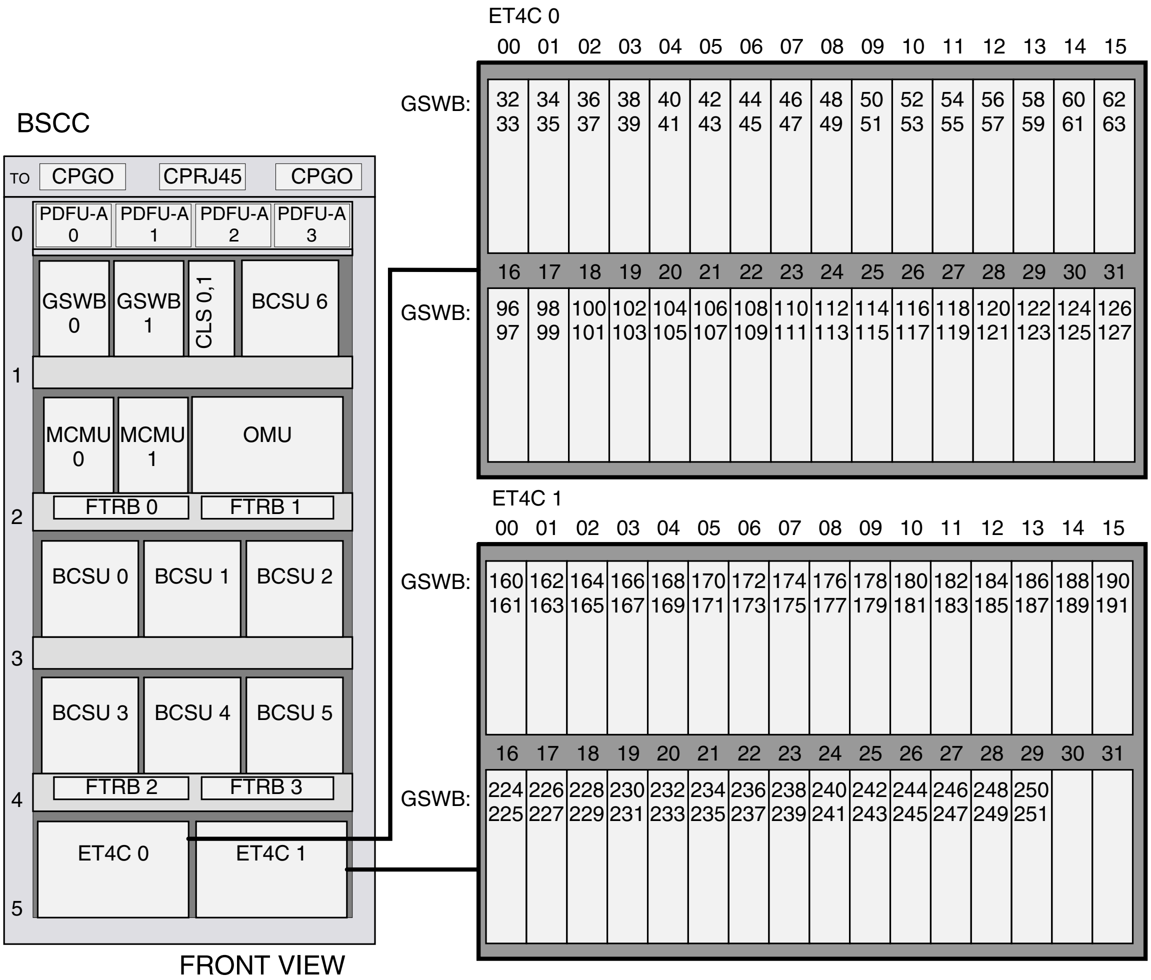

Figure 7. ET4C-B cartridges and ET2A/ET2E-S/SC indexes in BSC3i.

BSC2

A low cabinet BSC, the BSC2, can have up to seven ET5C cartridges, each having space for 16 2Mbit ET PCM 's plug-in units. This makes it possible to have a maximum of 112 2Mbit ET PCM's in one BSC; see figure below.

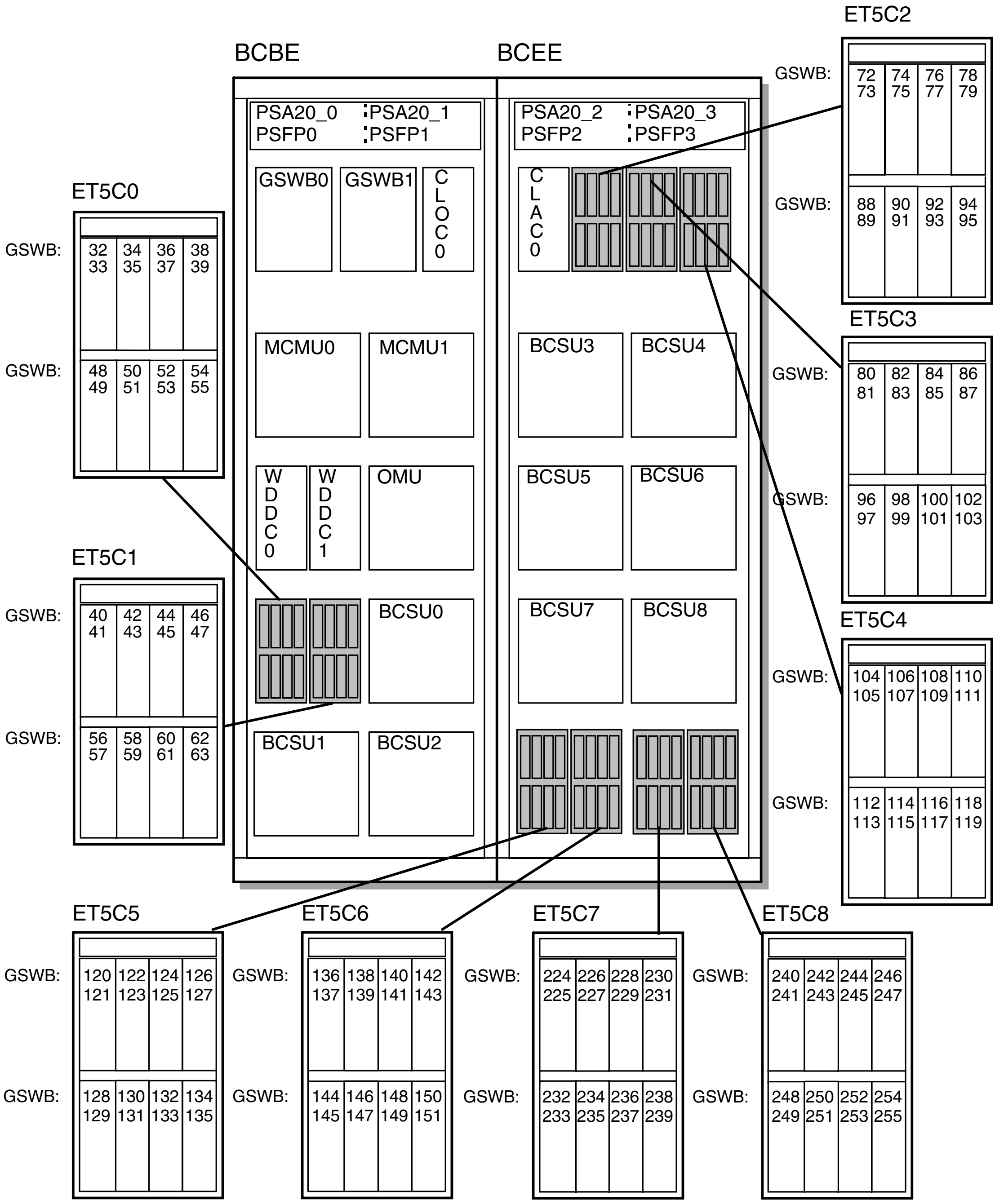

Figure 8. ET5C cartridges and ET2E/A indexes in BSC2

High cabinet BSC

In a high cabinet BSC (used only in the ETSI environment), there can be seven ET1C cartridges and two ET5C cartridges. Each ET1C cartridge can contain eight ET1E plug-in units and each ET5C cartridge can contain eight ET2E plug-in units, making it possible to have up to 88 2Mbit ET PCM's in one BSC. See figure 9 ET indexes with GSWB in high cabinet BSC.

Cartridge	ET1 C 0	ET1 C 1	ET1 C 2	ET1 C 3	ET1 C 4	ET1 C 5	ET1 C 6	ET5 C 0	ET5 C 1
PCM	32	40	48	56	72	80	88	96/97	112/113
Index	33	41	49	57	73	81	89	98/99	114/115
	34	42	50	58	74	82	90	100/101	116/117
	35	43	51	59	75	83	91	102/103	118/119
	36	44	52	60	76	84	92	104/105	120/121
	37	45	53	61	77	85	93	106/107	122/123
	38	46	54	62	78	86	94	108/109	124/125
	39	47	55	63	79	87	95	110/111	126/127

Figure 9. ET indexes with GSWB in high cabinet BSC

For more information, refer to BSS integration overview.

5 Creating the A interface

In this phase the MSC, the transcoder, and the BSC are configured to enable the MSC and the BSC to communicate properly with each other.

5.1 Connecting the A interface ET

Each A interface needs its own ET . The ETs used for the A interface must be the ones that supply synchronisation to the BSC's CLS units. There are three such ETs per BSC, and their default unit numbers are shown in the table below. It is possible to use any other ET for the synchronisation by changing the position of the corresponding synchronisation cable in the ET cartridge.

Table 1. The default synchronisation ETs

BSC type	ET type	GSW type	Default synchronisation ETs
BSC	ET1E	GSWB	32,33,34
BSC2	ET2E/A, ET2E-C, ET2E-S/SC	GSWB	32,40,48 (only even ETs possible)
BSC3i	ET2A, ET2E-S/SC	GSWB	32, 96, 160, 224 (only even ETs possible)

For further information on creating the A interface, refer to Creating the transcoder devices, Creating the MTP, Creating the SCCP, and Creating the speech channels.

For an overview, go to BSS integration overview.

Steps

1. Check that the ET is connected (WIP)

```
WIP:GSW:<PCM circuit number>;
```

If the ET is already connected, it has a controlling BCSU (Base Station Controller Signalling Unit) and process info. The controlling process can be SC7PRB A interface, ABIPRB Abis interface, SI1PRB ISDN Abis interface, or ERATES Gb interface.

Example 1.

```
WIP:GSW:32&33&41&46;

     EXECUTION STARTED


     DX 200    DX220-LAB                  2002-05-29  12:13:06
     SWITCH TYPE = GSW

        32 BCSU     SC7PRB  ETPCM       -                -          SMUXPCMS
           31H      01B1H   0000H       0000H            0202H       256
        33 BCSU     ABIPRB  ETPCM       -                -          SMUXPCMS
           31H      01BFH   0000H       0000H            0000H       264 -   271
        41 BCSU     ERATES  ETPCM       -                -          SMUXPCMS
           34H      010AH   0000H       0000H            0000H       -
        46 BCSU     SI1PRB  ETPCM       -                -          SMUXPCMS
           31H      0109H   0000H       001FH            0000H       368 -   375

     TOTAL OF 4 PCM CIRCUITS
     COMMAND EXECUTED
```

2. For implementing this step you have the following alternatives:

a. When: ET is already connected

Check that the ET is in WO state and restart the ET (USU)

The state of the ET can be changed with command `USC`.

The ET must be restarted to ensure that the correct ET software is loaded into the unit.

- ETSI:
  `USU:ET,<unit index>,C=TOT;`
- ANSI:
  `USU:ET,<unit index>,C=DSK;`

Note

Both ET's in the same plug-in unit will be restarted concurrently.

b. When: ET is not connected

Connect the ET (WUC)

```
WUC:ET,<unit index>:<plug-in unit
type>,0:IF=A:BCSU,<bcsu index>;
```

Parameter	Explanation
plug-in unit type	Type of the ET: ETSI: ET1E, ET2E, ET2E-C, ET2E-S or ET2E-SC. ANSI: ET2A.

If the controlling BCSU is not already in WO-EX state, the state of the BCSU must be changed to WO-EX. Once the BCSU's state is WO-EX, the state of the ET can be changed to WO-EX, too.

Note

When using ET2E/A, ET2E-C or ET2E-S/SC plug-in units, the even-numbered ET must be connected before the odd-numbered one.

3. Check and change the functional modes for the ET if needed

   The status of the frame alignment mode must be the same at both ends of the PCM line.

   For ET1E cards the frame alignment mode is set by strapping.

For the ET2E/A, ET2E-C or ET2E-S/SC the frame alignment mode is set by MML. The frame alignment mode strapping in the ET2E/A, ET2E-C or ET2E-S/SC is used only during the unit restart when the software cannot be loaded for some reason.

1. Output the functional modes of the ET2E/A, ET2E-C or ET2E-S/SC (ETSI: YEI, ANSI: YEH)

   - ETSI:

     ```
     YEI:ET,<unit index>;
     ```

   - ANSI:

     This means the values of the strappings to be programmed:

     ```
     YEH:<unit type>,<unit index>;
     ```

2. Change the functional mode if needed (ETSI: YEC, ANSI: YEG)

   - ETSI:

     ```
     YEC:ET,<unit index>:NORM,<frame alignment
     mode>;
     ```

   - ANSI:

     Note that the T1 functional modes have to be the same at both ends of the T1 line.

     ```
     YEG:<unit type>,<unit index>:<superframe
     mode>,<line code type>,<outgoing signal
     level>;
     ```

5.2 Creating the transcoder devices

For further information on creating the A interface, refer to Connecting the A interface ET, , Creating the MTP, Creating the SCCP, and Creating the speech channels.

For an overview, go to BSS integration overview.

In this phase the transcoder is configured. The transcoder is needed between the MSC and the BSC for speech compression. It compresses 64 kbit speech time slots coming from the MSC to 16 or 8 kbit speech time slots going to the BSC. Decompression is carried out in the opposite direction.

Choose one of the following procedures, depending on the type of TCSM and the type of configuration used.

5.2.1 Creating the TCSM2

The TCSM2 is a functional unit of the BSC. The BSC monitors the TCSM2 by using a LAPD link which is connected from the TCSM2's Transcoder Controller (TRCO) to the BSC's Operation and Maintenance Unit (OMU). The LAPD link is allocated to the 2 Mbit/s PCM frame (ETSI), or to the 1.5 Mbit/s T1 frame (ANSI), which carries TCH/CCS7 between the MSC and the BSC. It is a 16 kbit/s link using the first two bits in time slot one (for ETSI, see figure 3 Time slot allocation for full-rate traffic on Ater 2Mbit/s interface with the TCSM2 (ETSI) and for ANSI, figure 4 A interface time slot allocation (ANSI)). In addition to monitoring, the LAPD link is also used for configuring, alarms, remote MMI sessions, and for software downloading to the TCSM2.

The TCSM2 software is kept in the BSC's Winchesters and consists of three modules; software for the TRCO units, for the ET2E/A, ET2E-C or ET2E-S/SC units, and for the TR16 (ETSI) or TR12 (ANSI) units. These software modules are downloaded to the TCSM2 when necessary, that is when there is no software in the TCSM2 or it is different from that in the BSC.

One TCSM2 rack can contain up to eight transcoder units as shown in figures 10 TCSM2 rack and cartridges (ETSI) and 11 TCSM2 rack and cartridges (ANSI). Each transcoder unit consists of the transcoder cartridge and one ET cartridge having up to four ET2E/A, ET2E-C or ET2E-S/SC plug-in units.

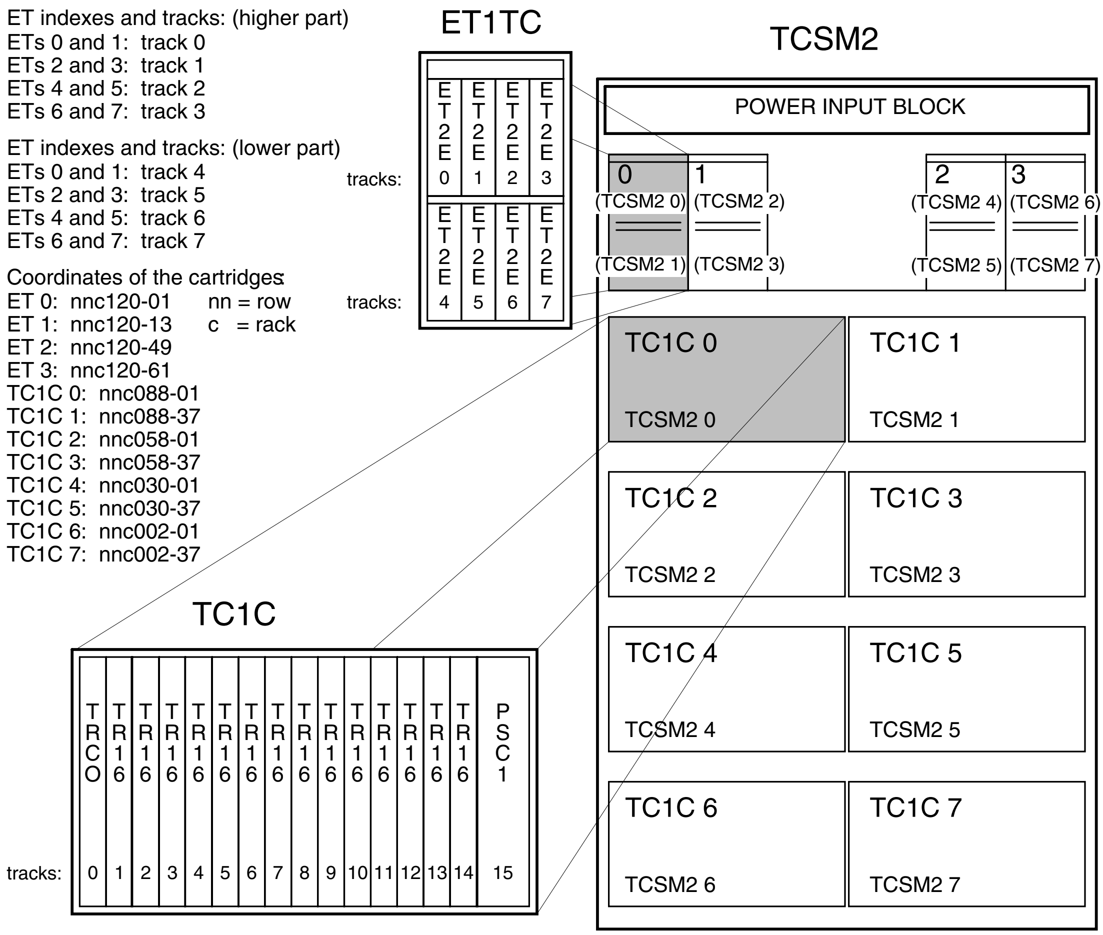

Figure 10. TCSM2 rack and cartridges (ETSI)

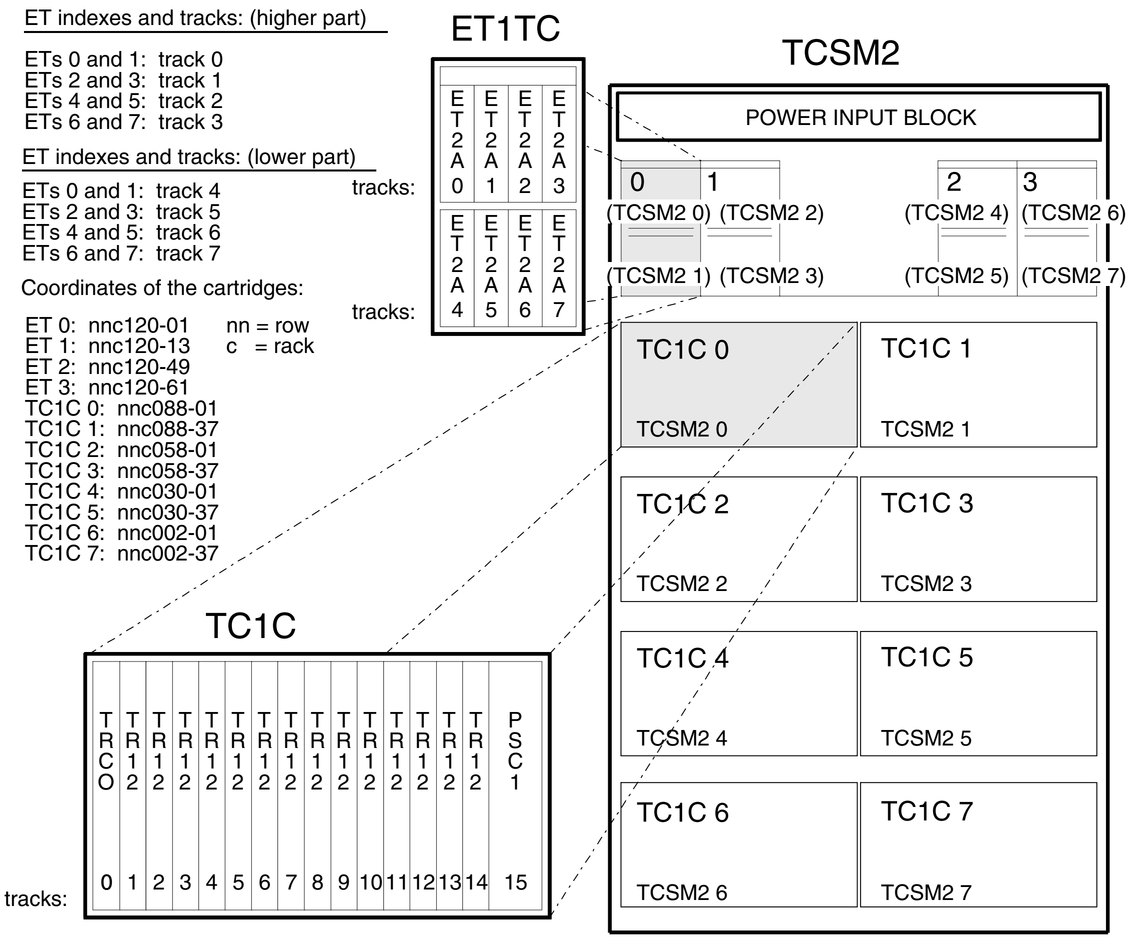

Figure 11. TCSM2 rack and cartridges (ANSI)

The TCSM2 rack, transcoder and ET cartridges along with the plug-in units are created to the BSC's equipment database. It is important to create the configuration and especially the transcoder ETs correctly to the BSC since they are used to define the type and the number of the A interface PCMs (in ETSI) or T1s (in ANSI). This information is used by the transcoder when it configures its PCMs/T1s during restart.

The procedure consists of the following phases:

- Configuring the hardware for the TCSM2 (steps 1–8)
- Connecting the TCSM2 functional units (steps 9–14)
- Configuring the TCSM2 (steps 15–16)

In this procedure, parameter `unit index` refers to the number of the ET in the BSC.

Steps

1. Create the rack for TCSM2 (WTJ)

```
WTJ:TC2E,<rack or cabinet coordinate>:PSFP=2,PSA=2;
```

Parameter	Explanation
rack or cabinet coordinate	Coordinate of the TCSM2.

2. Create a cartridge for the TC1C (WTC)

```
WTC:TC1C,<cartridge coordinate>:P1=<coordinate>;
```

Parameter	Explanation
cartridge coordinate	Coordinate of the transcoder unit. See figure TCSM2 rack and cartridges (ETSI) or TCSM2 rack and cartridges (ANSI).

3. Create the TCSM unit (WTU)

```
WTU:TCSM,<unit index>:<cartridge coordinate>;
```

Parameter	Explanation
cartridge coordinate	Coordinate of the transcoder unit. See figure 10 TCSM2 rack and cartridges (ETSI) or 11 TCSM2 rack and cartridges (ANSI).

4. Create transcoder controller plug-in unit, TRCO (WTP)

```
WTP:TCSM,<unit index>:TRCO,0,0::GENERAL,2,<unit
index>,TSL,1;
```

5. Create TR16/TR12 plug-in units (WTP)

   Two plug-in units are needed for each A interface PCM/T1:

```
WTP:TCSM,<unit index>:<piu type>,<piu index>,<track>;
```

Parameter	Explanation
piu type	ETSI: TR16, ANSI: TR12.
piu index	Index of the TR16/TR12.
track	Track of the TR16/TR12. For the right values see figure TCSM2 rack and cartridges (ETSI) or TCSM2 rack and cartridges (ANSI).

6. Create the ET1TC cartridge (WTC)

```
WTC:ET1TC,<cartridge coordinate>;
```

Parameter	Explanation
cartridge coordinate	Coordinate of the ET1TC cartridge. See figure TCSM2 rack and cartridges (ETSI) or TCSM2 rack and cartridges (ANSI).

7. Create the unit ET1TC cartridge (WTU)

```
WTU:TCSM,<unit index>:<coordinate of cartridge>;
```

Parameter	Explanation
coordinate of cartridge	Coordinate of the ET1TC cartridge. See figure 10 TCSM2 rack and cartridges (ETSI) or 11 TCSM2 rack and cartridges (ANSI).

8. Create ET2E/A, ET2E-C or ET2E-S/SC plug-in units (WTP)

```
WTP:TCSM,<unit index>,<unit coordinates>:<piu
type>,<index>,<track>;
```

Parameter	Explanation
unit coordinates	Coordinate of the ET1TC cartridge.

Parameter	Explanation
piu type	ETSI: ET2E, ET2E-C or ET2E-S/SC, ANSI: ET2A.
piu index	Index of the ET2E/A.
track	Track of the ET2E/A. For the right values see figure TCSM2 rack and cartridges (ETSI) or TCSM2 rack and cartridges (ANSI).

9. Check that the A interface ETs and the connectable plug-in units of the TCSM2 are connected in the right order

   They should be connected in the following order:

   1. A interface ET. See Connecting the A interface ET.
   2. At least one ET of the TCSM2.
   3. TRCO of the TCSM2.

   The ETs of the TCSM2 must be connected in ascending order starting from ET number one. The highway PCM is not connected.

Note

To delete the TCSM2, disconnect the units in reverse order.

10. Set the number of through connected channels (WGS)

```
WGS:<highway pcm>:<number of through connected
channels>;
```

11. Connect the transcoder ETs (WGC)

```
WGC:<highway pcm number>,<tc_pcm number>:POOL =<pool
type>:BCSU,<controlling unit index>;
```

Parameter	Explanation
pool type.	ANSI: NU = not used in the first pool if the TCSM2A-C is in use.
controlling unit index	Index of the BCSU controlling the speech circuits. One BCSU can handle up to eight A interface PCMs (ETSI)/T1s (ANSI).

Note

In ETSI:

Only the following TC_PCM types support the features Tandem Free Operation (TFO) and Noise Suppression:

FR (pool 1), HR (pool 2) and EFR&FR (pool 5).

AMR support is on pool 23.

12. Connect the TRCO to the BSC (WUC)

    This command creates the LAPD link between the BSC and the TCSM2. A circuit group DTCSM and the circuit to it are created at the same time.

    `WUC:TCSM,<unit index>:TRCO,0;`

13. Change the state of the TCSM2 to WO-EX (USC)

    This command automatically changes the state of the TCSM LAPD link to WO-EX. If the TCSM2 software does not exist or is different from that in the BSC, it is downloaded in this phase.

14. Check the state of the TCSM2 LAPD link (DTF)

    `DTF:TCSM,<unit index>:OMU;`

    The transcoder has less PCM types than the BSC has pools. This results in the fact that when you are checking the PCM circuits from the transcoder end, the PCM types are different than the pools in the BSC. The following execution printouts illustrate this:

Example 2. Printout from the BSC (ETSI)

```
ZWGO;
     EXECUTION STARTED

     ET_PCM   32        TC_PCM   POOL             TYPE  ET_PCM_TSLS   NR64 =   3
     TCSM-32                 1      5           EFR&FR     1  &&   8
                             2      2               HR     9  &&  12
                             3      3               DR    13  &&  20
                             4      5           EFR&FR    21  &&  28
                        THROUGH CONNECTIONS
```

```
 32 - 29  <-->  1 - 16
 32 - 30  <-->  1 - 31
```

Example 3. Printout from the transcoder (ETSI)

```
ZDDX:TCSM,32:"ZRD";
/* TRANSCODER PCM TYPES */

GROUP SWITCH      GSWB

PCM               TYPE

PCM-1             FR & EFR & D144
PCM-2             HR
PCM-3             EFR & FR & HR & D144
PCM-4             FR & EFR & D144
PCM-5             NU
PCM-6             NU
PCM-7             NU

/* COMMAND EXECUTED */
```

Example 4. Printout from the BSC (ANSI)

```
WGO;

     LOADING PROGRAM VERSION 8.14-0

     EXECUTION STARTED

     ET_PCM  32        TC_PCM  POOL              TYPE  ET_PCM_TSLS
     TCSM-32                1    21      EFR&DR&HS2&D144     1  &&  12
                            2     7               EFR&DR    13  &&  18
                            3    22      EFR&DR&HS4&D144    19  &&  24
                       THROUGH CONNECTIONS
                       -

     ET_PCM  33        TC_PCM  POOL              TYPE  ET_PCM_TSLS  NR64 =
     TCSM-33                1     5               EFR&FR     1  &&   6
                            2     5               EFR&FR     7  &&  12
                            3    23                  AMR    13  &&  18
                            4    23                  AMR    19  &&  22
                       THROUGH CONNECTIONS
                        33 - 24  <-->  1 - 24

     ET_PCM  34        TC_PCM  POOL              TYPE  ET_PCM_TSLS  NR64 =
     TCSM-34                1     -                   NU             -
                            2    10           EFR&DR&HS2     1  &&  12
                            3    10           EFR&DR&HS2    13  &&  22
                       THROUGH CONNECTIONS
                        34 - 24  <-->  2 - 24

     ET_PCM  35        TC_PCM  POOL              TYPE  ET_PCM_TSLS
     TCSM-35                1     -                   NU             -
                            2     2                   HR     1  &&   3
                            3     1                   FR     4  &&   9
                            4    23                  AMR    10  &&  15
                            5     2                   HR    16  &&  18
                       THROUGH CONNECTIONS
                       -
```

Example 5. Printout from the transcoder (ANSI)

```
ZDDX:TCSM,32:"ZRD";
/* TRANSCODER PCM TYPES */
GROUP SWITCH      GSWB
PCM               TYPE
PCM-1             NU
PCM-2             FR & EFR & D144
PCM-3             FR & EFR & D144
PCM-4             FR & EFR & D144
PCM-5             NU
PCM-6             NU
PCM-7             NU
/* COMMAND EXECUTED */
```

15. Add through connected channels (WGA)

    ```
    WGA:<highway pcm circuit>:<tc_pcm circuit>;
    ```

16. Output and check the through connected channels (WGO)

    ```
    WGO:<highway pcm number>:<output mode>;
    ```

Further information

For further information on creating the transcoder devices, refer to Creating the TCSM, multiplexed A interface and Creating the TCSM, non-multiplexed A interface.

For an overview, go to BSS integration overview.

5.2.2 Creating the TCSM, multiplexed A interface

In this phase the old transcoder, the TCSM, is created. This phase is not necessary if only the TCSM2 is used.

All equipment in the same channel must have a unique address.

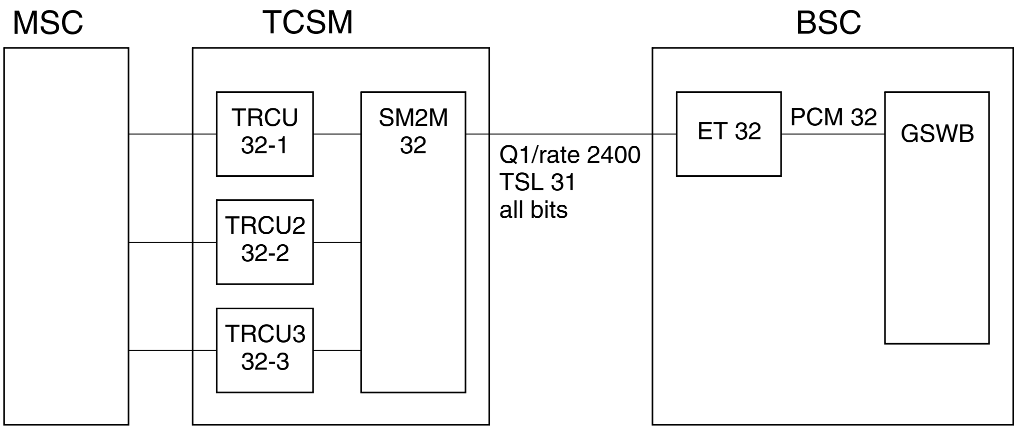

Figure 12. Multiplexed A interface with GSWB

Steps

1. Create a Q1 service channel (QWC)

   ```
   QWC:<service channel number>,<baud
   rate>,<bandwidth>,<used bits>:<external PCM-TSL>,<sub
   tsl>;
   ```

   Expected outcome

   This command will automatically create a Q1 circuit group and add a service channel to the created circuit group. The system generates an internal channel number for the created channel starting from 0.

2. Add SM2M to the service channel (QWA)

   ```
   QWA:CH=<service channel number>:SM2M=<SM2M
   index>:<au_address>;
   ```

Parameter	Explanation
SM2M index	PCM index.
au_address	Must be the same as defined locally in the SM2M.

3. Add TRCUs (QWA)

```
QWA:CH=<service channel number>:TRCU=<TRCU_index-
tc_index>:<au_address>;
```

Parameter	Explanation
tc_index	PCM index.

While creating a Transcoder Unit (TRCU) device, the corresponding transcoder PCMs are taken into use one by one.

4. For each added TRCU create transcoder PCM (WGC)

```
WGC:<highway pcm number>:POOL=1:BCSU,<bcsu index>;
```

5. Modify the type of the service channel if necessary (WGM)

   When modifying the service channel, the TCSM must be in state WO-EX or SE-NH, and it cannot have speech circuits in routes, and the new type time slot allocation in the Ater interface must be the same as in the old type.

6. Change the state of the service channel (QWS)

```
QWS:<service channel number>:AL;
```

Further information

For further information on creating the transcoder devices, refer to Creating the TCSM2 and Creating the TCSM, non-multiplexed A interface.

For an overview, go to BSS integration overview.

5.2.3 Creating the TCSM, non-multiplexed A interface

All equipment with the same alarm unit type must have a unique index in the BSC concerned. All equipment in the same channel must have a unique address.

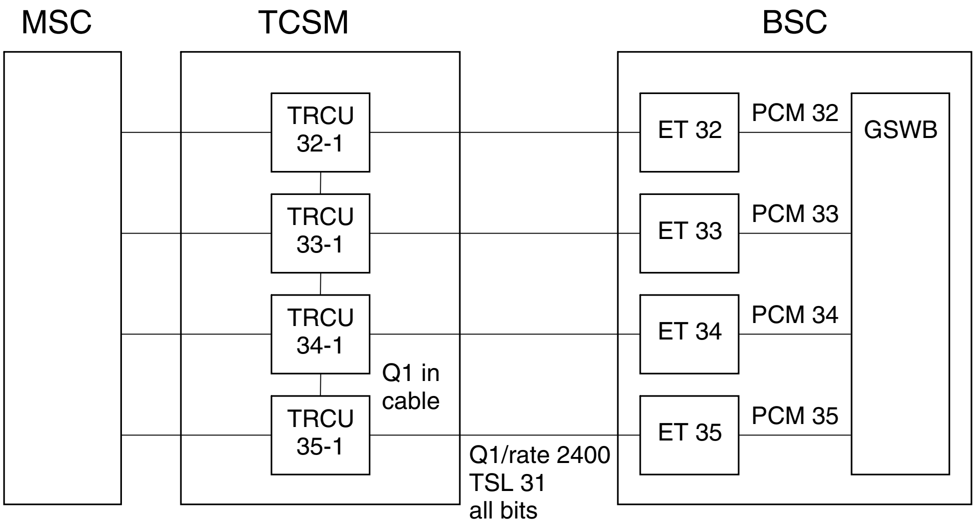

Figure 13. Non-multiplexed A interface with TCSM

Steps

1. Create a Q1 service channel (QWC)

```
QWC:<service channel number>,<baud
rate>,<bandwidth>,<used bits>:<external PCM-TSL>,<sub
tsl>;
```

2. Add TRCUs to the service channel (QWA)

```
QWA:CH=<service channel number>:TRCU=<TRCU_index-
tc_index>:<au_address>;
```

Parameter	Explanation
tc_index	PCM index.
au_address	Must be the same as defined locally in the TRCU.

3. For each added TRCU create transcoder PCM (WGC)

```
WGC:<highway pcm number>:POOL=1:BCSU,<bcsu index>;
```

4. Modify the type of the service channel if necessary (WGM)

When modifying the service channel, the TCSM must be in state WO-EX or SE-NH, and it cannot have speech circuits in routes, and the new type time slot allocation in the Ater interface must be the same as in the old type.

5. Change the state of the service channel (QWS)

```
QWS:<service channel number>:AL;
```

Further information

For further information on creating the transcoder devices, refer to Creating the TCSM2 and Creating the TCSM; multiplexed A interface.

For an overview, go to BSS integration overview.

5.3 Creating the MTP

For further information, refer to Connecting the A interface ET, Creating the transcoder devices, Creating the SCCP, and Creating the speech channels.

For an overview, go to BSS integration overview.

Steps

1. Create signalling links (NCC)

   It is strongly recommended to have at least two signalling links in the A interface. Furthermore, the links should not be controlled by the same Base Station Controller Unit (BCSU).

```
NCC:<signalling link number>:<external PCM-TSL>,<link
bit rate>:BCSU,<unit number>:<parameter set number>;
```

Parameter	Explanation
parameter set number	ETSI: value 0 is recommended. ANSI SS7: value 2 must be used.

2. Create the local signalling point code (NRP)

```
NRP:<signalling network>,<bsc signalling point
code>,<bsc signalling point name>,SEP:<ss7
standard>:<number of spc subfields>;
```

Parameter	Explanation
ss7 standard	ETSI: ITU-T is usually used. ANSI: ANSI is recommended.
number of spc subfields	ETSI: value 1 is usually used. ANSI: value 3 is usually used.

3. Create the signalling link set (NSC)

```
NSC:<signalling network>,<msc signalling point
code>,<msc signalling link set name>:<signalling link
number>,<signalling link code>;
```

The signalling link code of the signalling link must be the same as the code of the corresponding link in the MSC.

You can add up to four signalling links to the signalling link set. Repeat the last three parameters for each signalling link.

4. Add links to the signalling link set (NSA)

This step is needed only if all the links were not added to the link set in the previous step.

```
NSA:<signalling network>,<msc signalling point
code>,<msc signalling link set name>:<signalling link
number>,<signalling link code>;
```

5. Create the signalling route set (NRC)

```
NRC:<signalling network>,<msc signalling point
code>,<msc signalling point name>,<parameter set
number>,<load sharing status>,<restriction
status>:,,,0;
```

Parameter	Explanation
parameter set number	Value 1 is recommended.
load sharing status	D is recommended.
restriction status	R is recommended.

6. Allow activation of the signalling links (NLA)

```
NLA:<signalling link numbers>;
```

7. Allow activation of the signalling route (NVA)

```
NVA:<signalling network>,<msc signalling point code>:;
```

8. Change signalling link states (NLC)

```
NLC:<signalling link numbers>,ACT:;
```

9. Change route set state (NVC)

```
NVC:<signalling network>,<msc signalling point
code>::ACT;
```

5.4 Creating the SCCP

For further information on creating the A interface, refer to Connecting the A interface ET, Creating the transcoder devices, Creating the MTP, and Creating the speech channels.

For an overview, go to BSS integration overview.

The parameter values shown in the table apply in each step in this procedure.

Parameter	Explanation
subsystem number	ETSI: FE, ANSI: DE.
subsystem name	ETSI: BSSAP, ANSI: RSAP.

Steps

1. Create service (NPC)

```
NPC:<signalling_network>,03,SCCP:Y:Y,208,10F;
```

2. Define SCCP for the BSC's own signalling point (NFD)

```
NFD:<signalling network>,<bsc signalling point
code>,<signalling point parameter set
number>:<subsystem number>,<subsysten name>,<subsystem
parameter set number>,;
```

Parameter	Explanation
signalling point parameter set number	ETSI: value 2 is recommended.
subsystem number	ETSI: FE, ANSI: DE.
subsystem name	ETSI: BSSAP, ANSI: RSAP.
subsystem parameter set number	ETSI: value 1 is recommended.

3. Define SCCP for the MSC's signalling point (NFD)

```
NFD:<signalling network>,<msc signalling point
code>,<signalling point parameter set
number>:<subsystem number>,<subsystem name>,<subsystem
parameter set number>;
```

See the previous step for recommended parameter values.

4. Modify broadcast status of SCCP signalling points (OBM)

```
OBM:<signalling network>,,<subsystem number>::Y;
```

5. Modify the local broadcast status of SCCP subsystems (OBC)

```
OBC:<signalling network>,,<subsystem number>::Y;
```

6. Change the SCCP state at BSC side (NGC)

```
NGC:<signalling network>,<bsc signalling point
code>:ACT;
```

7. Change the SCCP state at MSC side (NGC)

```
NGC:<signalling network>,<msc signalling point
code>:ACT;
```

8. Change subsystem state at BSC side (NHC)

```
NHC:<signalling network>,<bsc signalling point
code>:<subsystem number>:ACT;
```

9. Change subsystem state at MSC side (NHC)

```
NHC:<signalling network>,<msc signalling point
code>:<subsystem number>:ACT;
```

5.5 Creating the speech channels

For further information on creating the A interface, refer to Connecting the A interface ET, Creating the transcoder devices, Creating the MTP, and Creating the SCCP.

For an overview, go to BSS integration overview.

Speech circuits are used to carry the actual user data through the A interface. One circuit is needed for each ongoing call. With conventional hunting the circuit is chosen by the MSC which means the MSC has to know the circuits of the BSC and their status. That is why the circuits must be identified by both the MSC and the BSC. This is accomplished by using CIC codes. A CIC code consists of the CCSPCM and the time slot of the circuit. The CIC codes must be the same at both ends.

The optional feature *Reversed Hunting* can be activated here. The following instructions apply when activating the feature in a *new* BSC. If you want to *change* the BSC to use Reversed Hunting instead of normal hunting, see Reversed Hunting activation instructions.

For more information on Reversed Hunting, see A interface circuit allocation (ETSI) and Radio Channel Allocation procedures (ETSI and ANSI).

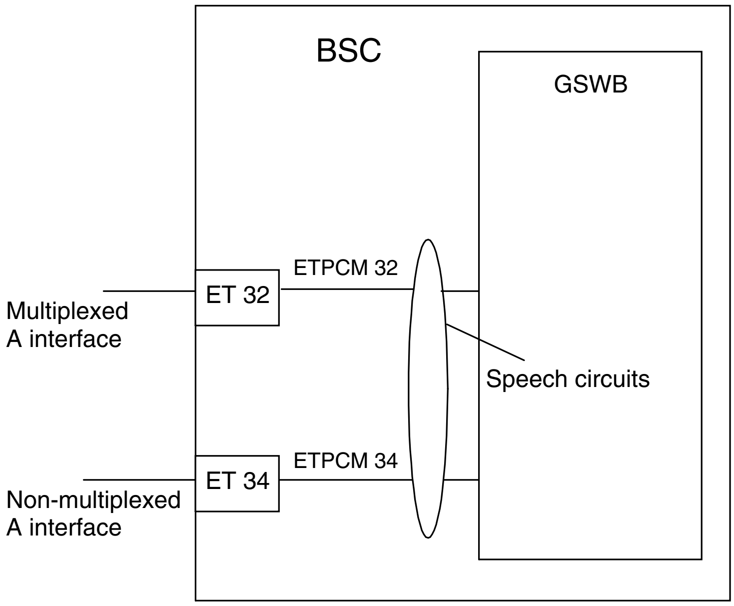

Figure 14. Multiplexed and non-multiplexed A interface with 8 kbit GSWB

Steps

1. Create a circuit group (RCC)

```
RCC:TYPE=CCS,NCGR=<ciruit group name>,CGR=<circuit
group number>:DIR=<direction>,NET=<signalling
network>,SPC=<msc signalling point code>,LSI=<line
signalling>;
```

Note

The circuit group name must have the same name as the one created for MSC.

Parameter	Explanation
direction	To activate Reversed Hunting: OUT. If you do not want to activate Reversed Hunting: IN.
line signalling	DUMMY, AINA0, AINA1, AIIN0, AIIN1, DSS01.

2. Add circuits to the circuit group (RCA)

   If more speech circuits are needed they must be added to the previously created circuit group.

- ETSI:

  In multiplexed cases:

  ```
  RCA:NCGR=<circuit group
  name>:ETPCM=<etpcm>,CRCT=<circuit(s)>,CRCTSTEP=1:
  CCSPCM=<number of PCM system>:;
  ```

  In non-multiplexed cases:

  ```
  RCA:CGR=1:ETPCM=<etpcm>,CRCT=<circuits>:CCSPCM=<number
   of PCM system>:;
  ```

Note

Four transcoder PCMs can be used if the BSC is equipped with the GSWB. When adding circuits of the fourth transcoder PCM, only time slots 1 up to 27 can be defined provided all the time slots are used for traffic. If signalling links are needed the number of the speech channels is reduced. See figure Time slot allocation for full-rate traffic on Ater 2Mbit/s interface with the TCSM2 (ETSI).

- ANSI:

  ```
  RCA:NCGR=<circuit group
  name>,ETPCM=<etpcm>,CRCT=<circuit(s)>,
  CIC=<circuit identification
  code>,CICDIR=<direction of CIC>;
  ```

3. Activate Reversed Hunting (optional)

   If you do not want to activate Reversed Hunting, go to step 4.

   1. Create route (RRC)

      ```
      RRC:EXT:ROU=<route
      number>,OUTR=AINTF,STP=1,NCGR=<circuit group
      name>;
      ```

Note

Route is created only if Reversed Hunting is used.

The route number must be the same as the circuit group number.

---

   2. Activate circuit group (CRM)

      ```
      CRM:NCGR=<circuit group name>:WO;
      ```

   3. Create circuit group for null PCM and add circuits (RCC, RCA)

```
RCC:TYPE=SPE,NCGR=<circuit group
name>,CGR=<circuit group
number>:FORMAT=0,HUNTED=N;

RCA:NCGR=<circuit group name>,CRCT=0-0&-1;
```

4. Activate Reversed Hunting (WOA)

```
WOA:2,643,A;
```

4. Change the state of the speech circuits (CEC)

   Immediately after creation the circuits are in NU-US state. The state must be changed to WO-EX before the circuits can be used.

```
CEC:ETPCM=<etpcm>,CRCT=<circuit>:<state>;

CEC:ETPCM=<circuit>,CRCT=<circuit>:WO;
```

Parameter	Explanation
state	If Reversed Hunting is used: BA. If Reversed Hunting is not used: BL.

6 Synchronising the A interface

For further information, refer to BSS integration overview.

Before you start

The PCM (or T1 in ANSI) circuits have been connected into operation between the MSC and the BSC. Normally all three of these PCM/T1 circuits are used for synchronisation. The synchronisation input with the highest priority (2M1) should be in the state CONNECTED and in use (USED INPUT). The other inputs 2M2 and 2M3 should be in the state CONNECTED. In CL3TG synchronisation unit there is fourth 2M input. The CL3TG unit also contains two synchronisation inputs (FS1 and FS2) for an external synchronisation source. For more information, see *CL3TG*, Plug-in unit descriptions.

Steps

1. Check the state of the synchronisation (DRI)

   `DRI;`

   Expected outcome

   Normally, it gives the following output:

   CL1TG:

```
INPUT      STATE      USED INPUT  PRIORITY
     ----- --------------- ---------- ----------
     2M1   CONNECTED          2M1         7
     2M2   CONNECTED           -          6
     2M3   CONNECTED           -          5
     SYNCHRONISATION UNIT WORKING MODE ......... HIERARCHIC SYNCHRONISATION
     FUNCTION AUTOMATIC RETURN FROM PLESIOCHRONOUS OPERATION ..........  ON
     SYNCHRONISATION UNIT    0 OSCILLATOR CONTROL WORD VALUE .......  31896
     FUNCTION AUTOMATIC USE OF REPAIRED INPUTS ........................  ON
     SYNCHRONISATION UNIT    1 OSCILLATOR CONTROL WORD VALUE .......  31635
     SYNCHRONISATION UNIT    0 OSCILLATOR CONTROL MODE ............. NORMAL
     SYNCHRONISATION UNIT    1 OSCILLATOR CONTROL MODE ............. NORMAL
     TIMER: SYNCHRONISATION SIGNAL MALFUNCTION TOLERANCE TIME ...      5 MIN
```

```
TIMER: REPAIRED SYNCHRONISATION INPUT OBSERVATION TIME .....    10 MIN
COMMAND EXECUTED
```

CL3TG:

```
INPUT      STATE      USED INPUT  PRIORITY
     ----- --------------- ---------- ----------
     2M1   CONNECTED           2M1         7
     2M2   CONNECTED            -          6
     2M3   CONNECTED            -          5
     2M4   CONNECTED            -          4
     FS1   DISCONNECTED         -          3
     FS2   DISCONNECTED         -          2
     SYNCHRONIZATION UNIT WORKING MODE ......... HIERARCHIC SYNCHRONIZATION
     FUNCTION AUTOMATIC RETURN FROM PLESIOCHRONOUS OPERATION ..........  ON
     FUNCTION AUTOMATIC USE OF REPAIRED INPUTS ........................  ON
     SYNCHRONIZATION UNIT    0 OSCILLATOR CONTROL WORD VALUE .......  31595
     SYNCHRONIZATION UNIT    1 OSCILLATOR CONTROL WORD VALUE .......  32211
     SYNCHRONIZATION UNIT    0 OSCILLATOR CONTROL MODE ............. NORMAL
     SYNCHRONIZATION UNIT    1 OSCILLATOR CONTROL MODE ............. NORMAL
     TIMER: SYNCHRONIZATION SIGNAL MALFUNCTION TOLERANCE TIME ...     5 MIN
     TIMER: REPAIRED SYNCHRONIZATION INPUT OBSERVATION TIME .....    10 MIN

     COMMAND EXECUTED
```

2. Create or delete synchronisation inputs if necessary (DRC, DRD)

```
DRC:<synchronization input>;

DRD:<synchronization input>;
```

Parameter	Explanation
synchronization input	2M1, 2M2, 2M3 (and 2M4 in CL3TG).

The number of synchronisation inputs depends on how many PCM/T1 circuits are connected between the MSC and the BSC. The maximum amount of synchronisation inputs is 3 in CL1TG and 4 in CL3TG.

3. Change the supervision timers for the inputs if necessary (DRS)

4. Check if there are any faults

The following steps include typical faults and instructions on how to correct them.

- For implementing this step you have the following alternatives:

a. When: The synchronisation units are not in synchronous operation mode.

Force the synchronisation units to use a specific input (DRS)

```
DRS::U=&lt;2M1 - 2M4&gt;;
```

b. When: The CL1TG will search the entire control range in order to lock the units to a certain input.

Wait for the alarm to be cancelled (which may take a couple of minutes) and remove the forced use of input (DRS)

```
ZDRS::U=OFF;
```

c. When: Operation mode is not hierarchical.

Check that the operation mode has been set to hierarchical (DRM)

```
DRM:H;
```

d. When: The settings of the ETs are not correct.

Check the settings of the ETs

The TCL signal should be 8 kHz. In ET1E it is selected by strapping, but in ET2E it is 8kHz permanently.

e. When: The control words of both CL1TGs and CL3TGs approach the values 0 to 65534.

Check the connection of the PCM/T1

It is possible that the incoming PCM/T1 circuit is connected to a loop.

5. Change the synchronisation inputs

   1. Disconnect the incoming signal from the first input

      Expected outcome

      This will cause normal PCM/T1 circuit alarms. After a time delay of more than the timer: SYNCHRONISATION SIGNAL MALFUNCTION TOLERANCE TIME allows, both synchronisation units will change to the second input. This can be seen in the LEDs of the CL1TG/CL3TG plug-in units and on the alarm printer:

```
2641 FAILURE IN SYNCHRONISATION SIGNAL
0630 SYNCHRONISATION SIGNAL CHANGED
```

   2. Disconnect the incoming signal from the second output

Expected outcome

The results should be similar to the earlier ones.

6. Go to plesiochronous mode of operation

   Disconnect the incoming signal from the third input (the last synchronisation input has been disconnected) in CL1TG or fourth in CL3TG.

   Expected outcome

   The synchronisation units will go to PLESIOCHRONOUS OPERATION mode. All synchronisation input indicators in the active CL1TG/CL3TG unit will extinguish, only the current indicator light is on. All 3/4 input indicators in the passive CL1TG/CL3TG unit are lit, but not the current indicator light. The alarm printer will print out the following:

```
2641 FAILURE IN SYNCHRONISATION SIGNAL

2631 OPERATION MODE CHANGED TO PLESIOCHRONOUS
```

7. Return to synchronous mode of operation

   Return the PCM/T1 circuits to their normal state one by one starting from the circuit with the lowest priority.

   Expected outcome

   The synchronisation units will synchronise themselves to the input 2M3/2M4 after a time delay of more than the timer REPAIRED SYNCHRONISATION INPUT OBSERVATION TIME. On the alarm printer the following alarms will be cancelled:

```
2641 FAILURE IN SYNCHRONISATION SIGNAL

2631 OPERATION MODE CHANGED TO PLESIOCHRONOUS
```

8. Check possible slips in the synchronous mode of operation (YMO)

   ```
   YMO:ET,<index>:SLI;
   ```

   The observation begins daily at 00.00 and should normally show no slips.

9. Check oscillator adjustments

   The CL1TG has no adjustments in the synchronous mode of operation.

7 Adding DN2, SSS, DMR and BBM to the service channel

For further information, refer to BSS integration overview.

All equipment with the same alarm unit type must have a unique index in the BSC concerned. All equipment in the same channel must have a unique address.

DN2	The Q1 service channel comes in TSL31 bits 7-8 to the 2M port of the DN2 interface unit (IU2). The Q1 service channel is forwarded through an extra loop connection to the Control Unit (CU); either one port of the IU2 is connected to the 2M interface of the CU or two IU2 ports are connected together with a local cable. The supported baud rates of the service channel are 1200 and 2400.
SSS	The Supervisory Substation is located in the same rack with other transmission equipment, normally with the DN2. The Q1 service channel is forwarded to the SSS with a local cable.
DMR	The Digital Microwave Radio link cannot pick the Q1 service channel from a time slot. The Q1 service channel is forwarded to the DMR with a local cable from another source, normally DN2. The supported baud rates of the service channel are 1200, 2400, 4800, and 9600.
BBM	The Baseband Modem cannot pick the Q1 service channel from a time slot. The Q1 service channel is forwarded to the BBM through an Integrated Line Terminal (ILT) plug-in unit from the DN2.

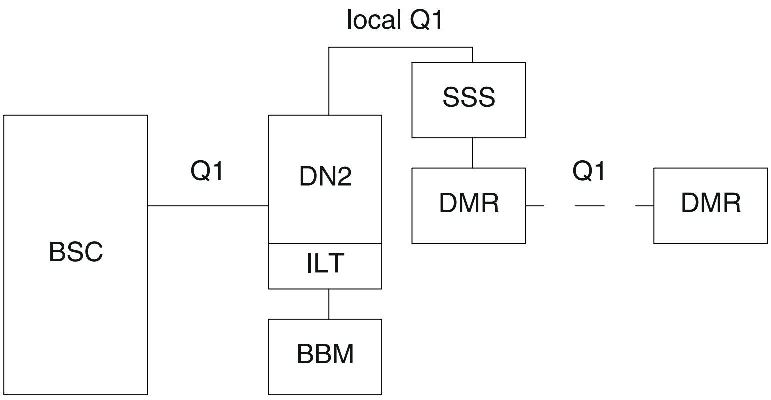

Figure 15. DN2 configuration examples

Steps

1. Create the service channel (QWC)

```
QWC:<service channel number>,<baud
rate>,64,MS:<external PCM-TSL>,<sub tsl>;
```

Parameter	Explanation
baud rate	1200 recommended.
sub tsl	Time slot 31 recommended.

2. Add equipment to the service channel (QWA)

```
QWA:CH=<service channel number>:DN2=<DN2 index>:<alarm
unit address 1>;

QWA:CH=<service channel number>:BBM=<BBM index>:<alarm
unit address 2>;

QWA:CH=<service channel number>:DMR=<DMR index>:<alarm
unit address 3>;

QWA:CH=<service channel number>:SSS=<SSS index>:<alarm
unit address 4>;
```

Addresses have to be set locally to the equipment with a hand-held service terminal.

3. Modify the type of the service channel if necessary (WGM)

   When modifying the service channel, the TCSM must be in state WO-EX or SE-NH, and it cannot have speech circuits in routes, and the new type time slot allocation in the Ater interface must be the same as in the old type.

4. Change the state of the service channel (QWS)

   ```
   QWS:<service channel number>:AL;
   ```

8 Creating the Abis interface

For further information, refer to BSS integration overview.

In this phase, the ET is connected to the Abis interface to connect the base stations to the BSC (see the figure below).

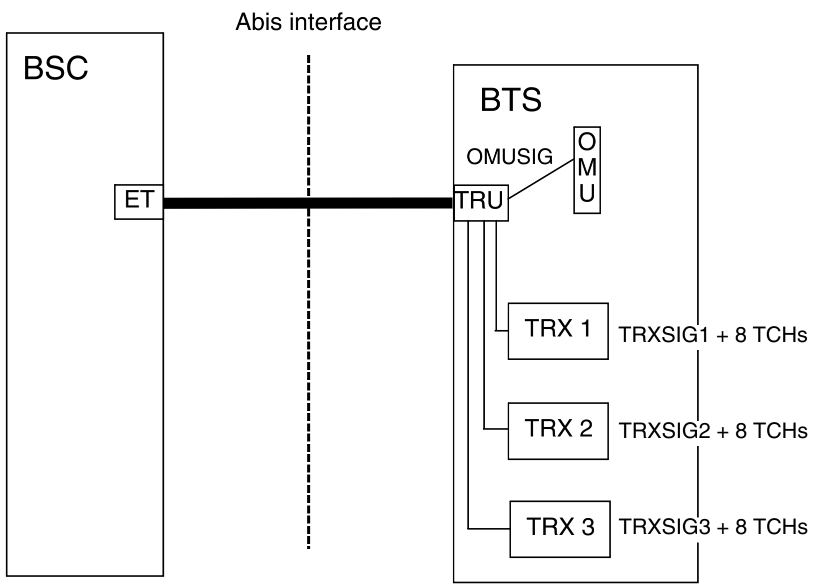

Figure 16. Abis interface

Steps

1. Check that the ET is connected (ETSI: WIP, ANSI: WTI)

   The ET must be connected before it can be used. See Connecting the A interface ET for how to check if the ET is already connected.

2. For implementing this step you have the following alternatives:

a. When: ET is already connected

Check that the ET is in WO state and restart the ET (USU)

The state of the ET can be changed with command `USC`.

The ET must be restarted to ensure that the correct ET software is loaded into the unit.

- ETSI:

  `USU:ET,<pcm index>,C=TOT;`
- ANSI:

  `USU:ET,<pcm index>,C=DSK;`

b. When: ET is not connected

Connect the ET (WUC)

```
WUC:ET,<ET index>:<plug-in unit
type>,0:IF=ABIS:BCSU,<BSCU index>;
```

Parameter	Explanation
plug-in unit type	Type of the ET: ETSI: ET1E, ET2E or ET2E-C, ET2E-S, ET2E-SC. ANSI: ET2A.

1. Change the state of the BCSU to WO-EX
2. Change the state of the ET to WO-EX

3. Check and change the frame alignment mode (ETSI)/T1 functional mode (ANSI) for ET if needed

   See Connecting the A interface ET for more information about configuring the frame alignment mode/T1 functional mode.

9 Initialising base stations

Each base station has one LAPD link called OMUSIG (see figure 16 Abis interface). It is connected to the Operation and Maintenance Unit (OMU) of the base station and used for O&M purposes like remote sessions to the BTS, software up- and downloading, transferring of alarms, and transferring of configuration information..

Each TRX has one LAPD link called TRXSIG and up to eight traffic channels. There can be fewer traffic channels if some of the TRXs' radio interface time slots are used for signalling. The bit rate of the LAPD links can be either 16 or 64 kbit/s. Also 32 kbit/s is possible for TRX links.

In this phase, the LAPD links are created and the base stations are created to the BSC's radio network database. In terms of BSC, a base station consists of BCF, BTSs, TRXs, and handover and power control parameters.

The procedure is slightly different depending on the type of the base station. The main difference between the integration of Nokia PrimeSite and the earlier generation base stations is that in PrimeSite, each TRX also has an OMU link in addition to a TRX link. This is due to the fact that each TRX is actually a base station.

Another difference is that the hardware database is attached only to Nokia 2nd generation and Talk-family base stations. In the other types, the TEI of the TRX links is the same as the TRX number in the BSC. The TEI of the OMU links is always 1.

The following instructions apply to Nokia 2nd generation, Talk-family, PrimeSite, UltraSite EDGE, MetroSite, and InSite base stations.

9.1 Creating LAPD links

For further information on initialising base stations, refer to Creating a base station and initialising its parameters, Attaching BCF software build to the BCF, Attaching BTS hardware database to the BTS, and Taking the base station into use.

For an overview, go to BSS integration overview.

A LAPD link can be created either to a certain physical Base Station Controller Signalling Unit (BCSU) or to a logical BCSU address. When the link is created to a logical BCSU address the actual controlling unit may not necessarily be the one given in the command. The concept of logical BCSU address was introduced to eliminate the effect of BCSU switchovers to radio network planning. In terms of MMI commands, only the command name is different with logical BCSU addresses.

It depends on the type of the BTS which links must be created. For more information, see Creating D channels on Abis interface.

Steps

- Create LAPD links (DSE)

  Create 16, 32 or 64 kbit LAPD links. Create the links for O&M signalling link (OMUSIG) and TRX signalling links (TRXSIG). If you are creating a 64kbit link, do not give `<SUB-TSL>`.

```
DSE:<D-channel link set name>:BCSU,<unit
index>:<service access point identifier>,<terminal
endpoint identifier>:<bitrate>,<PCM-TSL>,<SUB-TSL>;
```

Parameter	Explanation
service access point identifier	62 for OMUSIG, 0 for TRXSIG.
terminal endpoint identifier	Must the same as defined in the BTS. Usually the same as the TRX number. For OMU link, the value is 1.

If logical BCSUs are used, use the `DSL` command with the same parameters.

9.2 Creating a base station and initialising its parameters

For further information on initialising base stations, refer to Creating LAPD links, Attaching BCF software build to the BCF, Attaching BTS hardware database to the BTS, and Taking the base station into use.

For an overview, go to BSS integration overview.

Steps

1. Create a base control function (EFC)

   The base control function (BCF) is a logical counterpart of the actual base station. It is connected to the OMUSIG link created earlier.

   - All site types except Nokia PrimeSite:

     ```
     EFC:<bcf identification>,<site type>:DNAME=<D-
     channel link set name>;
     ```

   - Nokia PrimeSite:

     ```
     EFC:<bcf identification>,<site type>;
     ```

   The BCF parameters can be modified later with the `EFM` and `EFT` commands if needed.

2. Create a base transceiver station (EQC)

   A base transceiver station (BTS) is a logical counterpart of a sector in a base station site. It should not be confused with a base station even though they have the same abbreviation.

   ```
   EQC:BCF=<BTS identification>,BTS=<BTS
   identification>,NAME=<BTS name>,:CI=<cell
   identity>,BAND=<frequency band in use>:NCC=<network
   colour code>,BCC=<BTS colour code>:MCC=<mobile country
   code>,MNC=<mobile network code>,LAC=<location area
   code>:;
   ```

Note

The BTS parameters can be modified later with the `EQE`, `EQF`, `EQG`, `EQH`, `EQJ`, `EQK`, and `EQM` commands. The BTS must be locked when modifying the BTS parameters.

3. Create a transceiver (ERC)

   A transceiver (TRX) is a logical counterpart of the transmitter-receiver equipment in the base station. It is connected to the TRXSIG link created earlier.

- All site types except Nokia PrimeSite:

  ```
  ERC:BTS=<BTS identification>,TRX=<transceiver
  identification>::FREQ=<frequency>,TCS=<training
  sequence code>,TSCTSL=<Abis speech
  circuit>:DNAME=<D-channel telecom link set
  name>:CH0=<RTSL type 0>,SIGN=<subslots for
  signalling>;
  ```

- Nokia PrimeSite:

  To create a TRX to the Nokia PrimeSite BTS you must also define the D-channel O&M link set number.

  ```
  ERC:<BTS identification>,<TRX
  identification>::FREQ=<frequency>,TCS=<training
  sequence code>,TSCTSL=<Abis speech circuit>:<D-
  channel telecom link set name>,<D-channel O&M link
  set number>:<RTSL types from 0 to 7>;
  ```

4. Create default power control parameters of the BTS (EUC)

   Each cell must have a power control parameter set.

   ```
   EUC:BTS=<BTS identification>;
   ```

   You can modify the power control parameters with the EUG, EUA, EUQ, and EUS commands.

5. Create default handover control parameters (EHC)

   Each cell must have a handover parameter set.

   ```
   EHC:BTS=<BTS identification>;
   ```

   You can modify the handover control parameters with the EHG, EHA, EHS, EHQ, EHI, EHD, EHN, EHX, EHY, EHP commands.

6. Create neighbouring cell information (EAC)

   Define the list of cells where mobiles can make a handover when using the cell.

   Create the adjacent cells.

- Adjacent cell located in the same BSC:

```
EAC:BTS=<BTS identification>:ABTS=<adjacent cell
identification>;
```

- Adjacent cell located in a different BSC:

```
EAC:BTS=<BTS identification>:LAC=<location area
code>,CI=<cell identification>:NCC=<network colour
code>,BCC=<BTS colour code>,FREQ=<BCCH
frequency>,:
```

The adjacent cell parameters can be modified with the `EAM` command.

Example 6. Create a BCF according to the Abis time slot allocation shown in the table.

0	**LINK MANAGEMENT**				
1	TRXSIG1	OMUSIG	TCH.2	TCH.3	TRX 1
2	TCH.4	TCH.5	TCH.6	TCH.7	
3	TRXSIG2	TCH.1	TCH.2	TCH.3	TRX 2
4	TCH.4	TCH.5	TCH.6	TCH.7	

1. Create LAPD links

```
ZDSE:B0001:BCSU,0:62,1:16,33-1,2;

ZDSE:T0101:BCSU,0:0,1:16,33-1,0;

ZDSE:T0102:BCSU,0:0,2:16,33-3,0;
```

2. Create BCF

```
ZEFC:1,P:DNAME=B0001;
```

3. Create BTS
   - ETSI:

     ```
     ZEQC:BCF=1,BTS=1,NAME=BTS1:CI=1,BAND=900:NCC=0,BC
     C=0:MCC=214,MNC=1,LAC=1:;
     ```

   - ANSI:

     ```
     ZEQC:BCF=1,BTS=1,NAME=CELL1:CI=1,BAND=1900:NCC=0,
     BCC=0:MCC=214,MNC=1,LAC=1:;
     ```

4. Create TRXs

```
ZERC:BTS=1,TRX=1::FREQ=100,TSC=0,PCMTSL=33-
1:DNAME=T0001:SIGN=2,CH0=MBCCHC,CH1=NOTUSED;
```

```
ZERC:BTS=1,TRX=2::FREQ=55,TSC=0,PCMTSL=33-
3:DNAME=T0002:SIGN=1,CH0=NOTUSED;
```

The TRX parameters can be modified with the `ERM` command.

Example 7. Create a 1+1 site using Nokia PrimeSite base stations

The Abis time slot allocation is shown in the following table.

0	**LINK MANAGEMENT**				
1	TCH.0	TCH. 1	TCH.2	TCH.3	TRX 1
2	TCH.4	TCH.5	TCH.6	TCH.7	
3	TCH.0	TCH.1	TCH.2	TCH.3	TRX 2
	TCH.4	TCH.5	TCH.6	TCH.7	
25	TRX.1	OMU.1	TRX.2	OMU.2	

1. Create LAPD links.

```
ZDSE:B0101:BCSU,0:62,1:16,33-25,2;

ZDSE:B0102:BCSU,0:62,1:16,33-25,6;

ZDSE:T0101:BCSU,0:0,1:16,33-25,0;

ZDSE:T0102:BCSU,0:0,2:16,33-25,4;
```

2. Create BCF.

```
ZEFC:1,F;
```

3. Create BTSs.
   - ETSI:

     ```
     ZEQC:BCF=1,BTS=1,NAME=CELL1,:CI=1,BAND=900:NCC=0,
     BCC=0:MCC=512,MNC=18,LAC=1:;
     ZEQC:BCF=1,BTS=2,NAME=CELL2,:CI=2,BAND=900:NCC=0,
     BCC=0:MCC=512,MNC=18,LAC=2:;
     ```

   - ANSI:

     ```
     ZEQC:BCF=1,BTS=1,NAME=C1,:CI=1,BAND=1900:NCC=0,BC
     C=0:MCC=512,MNC=18,LAC=1:;
     ZEQC:BCF=1,BTS=2,NAME=C2,:CI=2,BAND=1900:NCC=0,BC
     C=0:MCC=512,MNC=18,LAC=2:;
     ```

4. Create TRXs.

   ```
   ZERC:BTS=1,TRX=1::FREQ=55,TSC=0,PCMTSL=33-
   1:DNAME=T0101,ONAME=B0101:CH0=MBCCB;

   ZERC:BTS=2,TRX=2::FREQ=66,TSC=0,PCMTSL=33-
   3:DNAME=T0102,ONAME=B0102:CH0=MBCCB;
   ```

7. Check and change the synchronisation of Nokia PrimeSite if necessary

---

Note

The synchronisation needs to be checked in the case of Nokia PrimeSite only.

Check that the synchronisation is suitable. The default is the internal clock of the BTS.

Change the synchronisation of the BCF to external synchronisation if necessary:

```
EFM:<BCF identification>:ESS=<external synchronisation
source>,MCT=<master clock trx>;
```

When ESS values and their meanings are:

- 0: BTS internal.

  master-TRX is not synchronised to external PCM

  master-TRX uses its own internal clock to generate a clock signal to slave-TRXs

- 2: PCM external.

  master-TRX is synchronised to external PCM

  master-TRX uses an external clock to generate a clock signal to slave-TRXs

- 3: other external.

  This parameter value is meant for example for GPS (Global Positioning System) and it may be used for synchronisation in the future.

MCT values and their meanings are:

- 0 indicates that the site is not synchronised (stand-alone)
- 1-16 indicates that the site is synchronised

Note

If you change ESS to have value 2, then you must give MCT a value between 1 and 16. Also keep in mind that when you modify the master clock TRX, the BCF must be locked.

9.3 Attaching BCF software build to the BCF

For further information on initialising base stations, refer to Creating LAPD links, Creating a base station and initialising its parameters, Attaching BTS hardware database to the BTS, and Taking the base station into use.

For an overview, go to BSS integration overview.

Base station software is kept in the BSC's Winchesters. There are 40 directories for BTS software builds and one directory for BTS hardware databases (see figure BTS software directories). Usually, only some of the directories are needed since the base stations can use the same builds with each other.

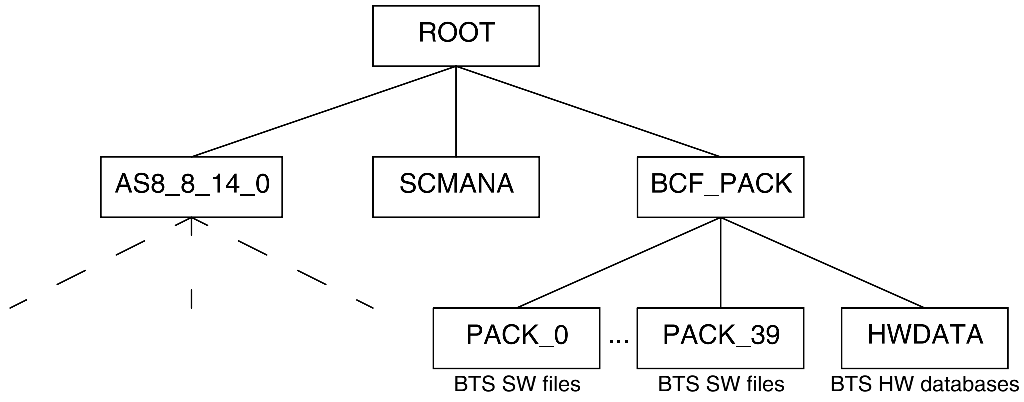

Figure 17. BTS software directories

Steps

1. Copy the BCF software build to the BSC's disks (IWX, IWY, IBC)

   Find an unused BCF software directory and copy the BCF software build to it from the floppy disk.

2. Create BTS software build (EWC)

   ```
   EWC:<build id>:MF=<master file name>,EXT=<master file
   extension>,SDIR=<subdirectory name>;
   ```

3. Set initial software build; optional (EWS)

   ```
   EWS:<site type>:<build id>;
   ```

4. Attach build to the BCF (EWA)

   If the Operation and Maintenance Unit (OMU) link is working, background downloading of the build to the base station is started. Otherwise, the build is only administratively attached to the BCF and the software is downloaded later.

   ```
   EWA:<number of BCF>:BU:<build id>;
   ```

5. Activate the build (EWV)

   If the BCF is in unlocked state it is restarted as the build is activated. Otherwise, only the state of the build is changed to DEF.

```
EWV:<number of BCF>:BU;
```

6. Confirm the execution of the command

   The program asks for a confirmation to execute the command. The command cuts all ongoing calls in the reseted BTS site. Confirm by YES (Y) or NO (N).

9.4 Attaching BTS hardware database to the BTS

For further information on initialising base stations, refer to Creating LAPD links, Creating a base station and initialising its parameters, Attaching BCF software build to the BCF, and Taking the base station into use.

For an overview, go to BSS integration overview.

Note

This is done only for Nokia 2nd generation and Talk-family base stations.

The BTS hardware database contains the base station's hardware configuration. Hardware database files are kept in the BSC's Winchesters in BCF_PACK\HWDATA directory as shown in figure BTS software directories.

Before you start

Before proceeding, you must have suitable hardware database files available. See *BTS documentation* on how to prepare a BTS hardware database.

Steps

1. For implementing this step you have the following alternatives:

   a. When: The BTS does not yet have a valid hardware database

      Once the BTS hardware configuration is available, copy it to the BSC

      The database files are:
      HWDATA_T.<ext> Database file in text format

HWDATAOM.<ext> Database file in binary format

b. When: The BTS already has a valid hardware database

Upload the hardware database to the BSC (EVU)

If the BTS already has a valid hardware database, it can be uploaded to the BSC instead of copying new files with the command `EVU`.

2. Create BTS hardware database (EVC)

Once the hardware database files have either been copied or uploaded to the BSC, the database must be created.

```
EVC:<database id>:NAME=<file name>,EXT=<file
extension>;
```

3. Attach hardware database to the BCF (EVA)

```
EVA:<bcf identity>:<database id>;
```

4. For implementing this step you have the following alternatives:

a. When: The hardware database has already been downloaded to the BTS

Activate the hardware database without downloading (EVV)

```
EVV:<bcf identity>:PAS:NODL;
```

b. When: The hardware database is not in the flash

Activate the hardware database with site reset (EVV)

The Operation and Maintenace Unit (OMU) link must be operational before the downloading.

```
EVV:<bcf identity>:PAS:SITE;
```

c. Activate the hardware database without site reset (EVV)

After this command the hardware database is in the flash but not in use. Site reset is needed to take it into use:

```
EVV:<bcf identity>:PAS:NORST;
```

9.5 Taking the base station into use

For further information on initialising base stations, refer to Creating LAPD links, Creating a base station and initialising its parameters, Attaching BCF software build to the BCF, and Attaching BTS hardware database to the BTS.

For an overview, go to BSS integration overview.

In this phase, the base station is taken into use by unlocking it.

Steps

1. Change status of BTS D channels (DTC)

   Change the state of the Operation and Maintenance (OMU) link and the TRX links to WO-EX:

   ```
   DTC:<D-channel link set name>:,WO;
   ```

Parameter	Explanation
D-channel link set name	Name of the LapD link.

2. Unlock the TRXs (ERS)

   If the higher level objects are already unlocked the transition from locked to unlocked causes a TRX reset in the BTS site. Otherwise, the reset is not done.

   ```
   ERS:BTS=<BTS identification>,TRX=<transceiver
   identification>:U;
   ```

3. Unlock the BTSs under the BCF (EQS)

   ```
   EQS:BTS=<BTS identification>:U;
   ```

   Expected outcome

   The transition from locked to unlocked causes a BCF reset. While the BCF is resetting, all its components and the BCF itself are in BL-RST (blocked-reset) state. During that time, the BCF is not available for traffic nor controllable by MML.

4. Monitor BCF reset

   Monitor the phases of the BCF reset with the service terminal extension BCF PHASE MONITORING, RPHASESX.

   1. Take the extension into use with the service terminal command

      ```
      ZDDS;ZLE:<character>,RPHASESX
      ```

character	Command character for the extension. Must not be used by other extensions.

2. Go to the extension command group

```
Z<character>
```

3. Start monitoring

```
DC:<bcf_nbr>
```

Expected outcome

The reset is over when all its components and the BCF itself are in WO (working) state.

5. Unlock the BCF (EFS)

```
EFS:<BCF identification>:U;
```

10 Testing BSS integration

Before you start

The test requires one of each network element (BTS, BSC, MSC, and HLR), and in fault conditions a PCM/T1 analyser (PC with GSM Protocol Analyser to trace A/Abis messages). All the network elements and connections must be operative and the network configuration valid.

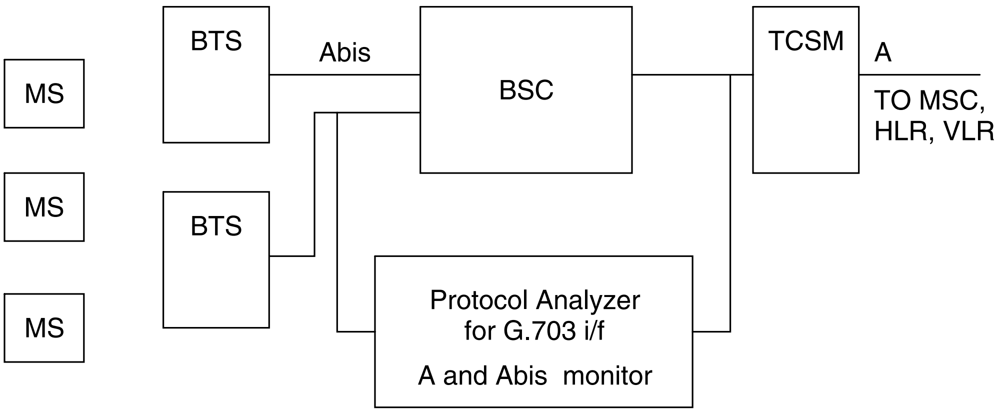

Figure 18. The test arrangements

The test cases are described in a general level. For more detailed information, refer to BSC SW release material: BSC System Test Cases and BSC Release Test Cases.

10.1 Testing local blocking of TRX

For an overview, go to BSS integration overview.

The purpose of the test is to verify the correct working of the BSS in local blocking (OMU MMI) of the TRX

Steps

1. Check the status of the signalling network with a BSC MML
2. Check current alarms in the system
3. Check that the TRX and the BTS to be tested are in the working state and operative
4. Lock the TRX locally from the BTS OMU MMI
5. Unlock the TRX locally from the BTS OMU MMI
6. Check any new alarms in the system

Expected outcome

1. Alarm concerning a TRX lock.
2. When the TRX is locked locally an announcement concerning this state is also sent to the BSC, and the BSC MML also shows that the TRX is locked and not available for traffic.

10.2 Testing supervision of TCSM (ETSI)

For an overview, go to BSS integration overview.

The purpose of the test is to verify the correct working of the supervision of the transmission equipment.

Steps

1. Verify that transmission is working correctly and there are no transmission alarms active in the BSC
2. Cause a channel fault to the transcoder unit for example by pulling out a TR15 unit
3. Check any new alarms in the system

Expected outcome

Alarm 2978 TRANSCODER UNIT TRC15 CHANNEL FAULT is active.

10.3 Testing supervision of TCSM2 (ETSI/ANSI)

For an overview, go to BSS integration overview.

The purpose of the test is to verify the correct working of the supervision of the TCSM2.

Steps

1. Verify that transmission is working correctly and there are no transmission alarms active in the BSC
2. Check the settings of the TCSM2 with remote MML ZDDT
3. Check that the TCSM2 hardware configuration match the hardware in the racks

   Use the service terminal command ZGT.
4. Cause a channel fault to the transcoder unit

   Do this for example by pulling out a TR16 (ETSI) or TR12 (ANSI) plug-in unit.
5. Check any new alarms in the system

Expected outcome

Alarm 2952 TRANSCODER PLUG-IN UNIT FAILURE is active.

10.4 Testing IMSI Attach

For an overview, go to BSS integration overview.

The purpose of the test is to verify the correct working of the BSS in IMSI attach .

Steps

1. Check the status of the signalling network with a BSC MML
2. Check current alarms in the system

3. Power up the mobile station

4. Check any new alarms in the system

Expected outcome

1. The mobile station finds the BTS.

2. IMSI_ATTACH message is seen in the Abis interface.

10.5 Testing location updating

For an overview, go to BSS integration overview.

The purpose of the test is to verify the correct working of the BSS in location updating.

Steps

1. Check the status of the signalling network with a BSC MML

2. Check current alarms in the system

3. Supply the PIN to the mobile station

4. Check any new alarms in the system

Expected outcome

The mobile station finds the network and ends on service state.

10.6 Testing MS to MS call

For an overview, go to BSS integration overview.

The purpose of the test is to verify the correct working of the BSS in a basic call.

Steps

1. Check the status of the signalling network with a BSC MML

SubMenu

2. Check current alarms in the system

3. Make a call from subscriber A (the calling subscriber) to subscriber B (the called subscriber)

4. Make subscriber B answer the call

5. Verify speech quality

6. Clear the call at subscriber A's mobile station

7. Check any new alarms in the system

Expected outcome

The call is successful and speech quality is good.

10.7 Testing MS to MS call, B busy

For an overview, go to BSS integration overview.

The purpose of the test is to verify the correct working of the BSS in a basic call when subscriber B is busy.

Steps

1. Check the status of the signalling network with a BSC MML

2. Check current alarms in the system

3. Make a call from subscriber A to subscriber B (subscriber B is busy)

4. After observing the busy tone at subscriber A's MS, clear the call at subscriber A's MS

5. Check that there are no hanging resources

6. Check any new alarms in the system

Expected outcome

Subscriber A receives the busy tone.

10.8 Testing MS to MS call, A subscriber IMSI detach

For an overview, go to BSS integration overview.

The purpose of the test is to verify the correct working of the BSS in a basic call when subscriber A makes IMSI detach during speech.

Steps

1. Check the status of the signalling network with a BSC MML
2. Check current alarms in the system
3. Make a call from subscriber A to subscriber B
4. Answer the call at subscriber B's MS
5. Make IMSI detach (subscriber A)
6. Check any new alarms in the system

Expected outcome

1. There are no hanging resources.
2. The call is set up as required and subscriber A releases the call.

10.9 Testing successful handover: free TCHs

For an overview, go to BSS integration overview.

The purpose of the test is to verify the correct working of the BSS in a successful handover, where free TCHs are available.

Steps

1. Check the status of the signalling network with a BSC MML
2. Check current alarms in the system
3. Check that there are free TCHs in the BTS where the subscriber A will move

4. Make a call from subscriber A to subscriber B

5. Answer the call at subscriber B's MS

6. Make a handover to subscriber A

7. Verify speech quality

8. Check any new alarms in the system

Expected outcome

The handover is successful and speech quality is good all the time.

10.10 Testing unsuccessful handover: no free TCHs

For an overview, go to BSS integration overview.

The purpose of the test is to verify the correct working of the BSS in an unsuccessful handover, where no free TCHs are available.

Steps

1. Check the status of the signalling network with a BSC MML

2. Check current alarms in the system

3. Make sure that there are no free TCHs in the BTS where subscriber A will move

4. Make a call from subscriber A to subscriber B

5. Answer the call at subscriber B's MS

6. Make a handover attempt to subscriber A

7. Check any new alarms in the system

Expected outcome

The handover fails and the call is released by the network unless the original channel is still adequate to continue the call.

10.11 Testing radio resource queuing in handover

For an overview, go to BSS integration overview.

The purpose of the test is to verify the correct working of the BSS in a successful handover, where radio resource has to be queued.

Steps

1. Check the status of the signalling network with a BSC MML
2. Check current alarms in the system
3. Make a call from subscriber A to subscriber B
4. Answer the call at subscriber B's MS
5. Reserve one TCH with one more MS and block other TCHs
6. Make a handover attempt to subscriber A
7. Release the occupied TCH for the handover attempt
8. Check any new alarms in the system

Expected outcome

The handover is successful after queuing and the call continues.

11 Test logs for BSS integration

While integrating the BSS, record confirmation on test execution and possible comments in the test logs.

Part of the logs can be used as a check list while testing.

Table 2. BSS specifications

BSC C number:
BSC name:
BSC Software release (xx.yy-zz):
TCSM/TCSM2 C number:
TCSM/TCSM2 Software release (xx.yy-zz):
BTS Software release:
Checked by:
Approved by:

Table 3. Creating the A interface

Observations:
Corrective actions:
Checked by:
Date:
Approved by:
Date:

Table 4. Creating the Abis interface

Observations:
Corrective actions:
Checked by:

Table 4. Creating the Abis interface (Continued)

Date:	
Approved by:	
Date:	

Table 5. Initialising the base stations

Observations:	
Corrective actions:	
Checked by:	
Date:	
Approved by:	
Date:	

Table 6. Testing BSS integration

TEST NUMBER:
Observations / used parameter values:
TESTING STATUS (OK/NOK):
Corrective actions/remarks:
Tested by:
Date:

For an overview, go to BSS integration overview.