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AM-TR-NIS-000117

Broadband Optical Transport Digital Microcell Connection Service - Interface and Performance Specifications

A technical description of the User-Network Interface and performance specifications for Ameritech Digital Microcell Connection Service.

To: Ameritech and Vendor Community

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1.   PURPOSE

This document describes the User-Network Interface and performance specifications for Ameritech Digital Microcell Connection service.

2.   CHANGE AND REISSUE

This is the first issue of this document. When revisions to this document are issued, this paragraph will provide a summary of changes and modifications.

3.   SERVICE DESCRIPTION

3.1.   Overview

Ameritech Digital Microcell Connection Service provides for the bidirectional transport of signals within the radio frequency (RF) spectrum bandwidth of 824 MHz to 894 MHz assigned to cellular mobile radio telephone services in the United States. This service provides, alternatively, for the transport of cellular RF spectrum assigned to either "non-wireline" (Band A) or "wireline" (Band B) cellular mobile carriers. This service would typically be employed for transport of cellular service signals between a cellular mobile carrier's radio frequency transceiver location ("microcell site") and another location ("host site") for RF signal processing.

3.2.   Architecture

Cellular RF bandwidth signals carried by a Digital Microcell Connection Service channel will be transported between sites over single-mode fiber optic transmission media. Interfaces to Digital Microcell Connection Service channels are portrayed in Figure 1. The Digital Microcell Connection Service channel interface specifications pertain to two interfaces: one electrical interface designated Network Interface "A" in Figure 1 and one optical interface designated Network Interface "B" in Figure 1.

The broadband RF electrical signals presented as in input to the Digital Microcell Connection Service channel at Network Interface "A" are sampled and digitally encoded in a Pulse Code Modulation (PCM) process. The resulting PCM digital signal representation is then used to directly modulate an optical laser operating at a wave-length of 1550 nm for transmission over a single-mode fiber towards and across Network Interface "B". The 1550 nm optical signal is combined via Wavelength Division Multiplexing (WDM) with a 1310 nm optical signal received over the same fiber from Network Interface "B".

Figure 1. Digital Microcell Connection Service Network Interface Definition
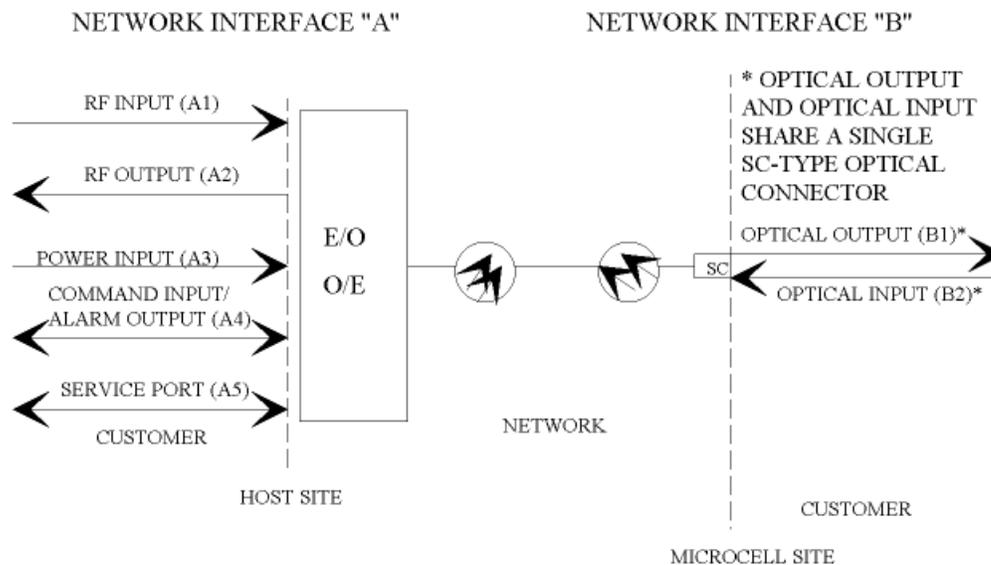
In the opposite direction of transmission, the optical signal presented as an input to the Digital Microcell Connection Service at Network Interface "B" operates at a 1310 nm wavelength as previously mentioned. After separation via WDM at the host site from the 1550 nm signal described above, the detected optical signal is converted to an electrical signal via a direct photo-detection demodulation process, then decoded via a corresponding PCM decoding process at the host site and filtered to present a broadband electrical signal of the appropriate bandwidth as RF output at Network Interface "A".

Digital Microcell Connection Service network transport is via a single fiber between Network Interface "A" and Network Interface "B". The transport distance for Digital Microcell Connection Service between Network Interface "A" and Network Interface "B" is limited by the insertion loss of the optical fiber to be less than 27 dB as measured at the controlling optical wavelength of 1550 nanometers.

Powering for the Digital Microcell Connection Service network equipment located at the host site will be provided by the customer according to the requirements specified in Section 4.1 for Network Interface "A". No power Interface requirements exist for Network Interface "B" at the microcell site.

Command inputs presented by the customer across Network Interface "A" are used for status and operational control of host site network equipment as specified in Section 4.1. Alarm out-

puts are presented to the customer across Network Interface "A" at the host site as specified in Section 4.1. These alarms are for the purpose of indicating a failure or degraded signal condition associated with the received optical signal or the optical demodulator. These alarms are not monitored from the network - therefore it is the responsibility of the customer to notify Ameritech when maintenance action is required. No alarm output interface requirements exist for Network Interface "B" at the mircocell site.

A service Port is available to the customer from the network equipment at the host site across Network Interface "A" as specified in Section 4.1. The service port is provided for the purpose of allowing the customer access to and control of Digital Microcell Connection Service monitoring, alarming, powering and operational status. Interface protocol and command/response message protocol and syntax specifications across the service port interface are provided in Section 4.1 and Appendix 1, respectively.

4.   INTERFACE SPECIFICATIONS

4.1.   Network Interface "A"

Network Interface "A", located at the Digital Microcell Connection Service host site, consists of five sub-interfaces (A1 through A5) as indicated in Figure 1. Four sub-interfaces (A1, A3, A4 and A5) are inputs to the Digital Microcell Connection Service channel. Three sub-interfaces (A2, A4 and A5) are outputs from the Digital Microcell Connection Service channel.

4.1.1.   Physical

This interface consists of four separate connectors of three different types.

RF Input (A1) and RF Output (A2) utilize individual standard 50 ohm impedance TNC female coaxial connectors, AMP type 228502-1 or equivalent.

Power Input (A3) and Command Input/Alarm Output (A4) together utilize a male 36 pin "D" style connector with mixed contacts, ITT Cannon DDM 36W4P or equivalent. Pin assignments are provided in Table 1.

Service Port (A5) utilizes a standard female DB-9 connector, Cinch 233-09-50-146 or equivalent. Pin assignments are provided in Table 2.

Table 1.

Pin	Power, Command or Alarm Signal
A1	+ 24 Volts DC Power
A3	Signal Ground

A4	+ 24 Volts DC Return
3	Host Digitizer Green LED Command (TTL)
22	Host Digitizer Fan Failure Alarm (TTL)
23	Host Digitizer General Failure Alarm (TTL)
24	Host Digitizer Standby Mode Command (TTL)
25	Host Optical Transceiver General Failure Alarm (TTL)
26	Host Optical Transceiver Standby Mode Command (TTL)
28	RS 485 + Alarm Channel from Network
29	RS 485 - Alarm Channel from Network
30	Order Wire + for Remote Site
31	Order Wire - for Remote Site
32	Host Digitizer Red LED Command (TTL)

Table 2.

Pin	Signal
2	RS-232 Tx Data
3	RS-232 Rx Data
5	Signal Ground
1,4,6,7,8,9	Unused

4.1.2.   Electrical

Broadband RF electrical signals are presented by the customer as an input to the Digital Micro-cell Connection Service Channel via the RF Input (A1) sub-interface as shown in Figure 1. Electrical signal specifications for this sub-interface as defined below in Table 3.

Broadband RF electrical signals are presented to the customer as an output from the Digital Microcell Connection Service channel via the RF Output (A2) sub-interface as shown in Figure 1. Electrical signal specifications for this sub-interface are defined below in Table 4.

Table 3.

RF INPUT (A1) ELECTRICAL SPECIFICATIONS
Impedance: 50 ohms Nominal
Bandwidth: 869 to 880 MHz and 890 to 891.5 MHz (Band A) OR 880 to 890 MHz and 891.5 to 894 MHz (Band B)
Maximum Signal Level: - 30 dBm

Table 4.

RF OUTPUT (A2) ELECTRICAL SPECIFICATIONS
Impedance: 50 ohms Nominal
Bandwidth: 824 to 835 MHz and 845 to 846.5 MHz (Band A) 835 to 845 MHz and 846.5 to 849 MHz (Band B)
Maximum Signal Level: 0 dBm

Maximum current at +24 volts DC on the Power Input sub-interface (A3) is 1.5 amperes. The peak-to-peak ripple voltage on the +24 VDC Power Input sub-interface (A3) as supplied by the customer shall not exceed 500 millivolts.

Command Inputs and Alarm Outputs (A4) are operated at standard TTL logic levels (5 volts ± 10%). Commands are indicated by TTI Hi. Alarms are indicated by providing a low resistance

(less than 100 ohms) to ground. Customer supplied voltages used to sense alarms must be biased positive with respect to ground (TTL Lo = 0 to 0.8 volts, TTL Hi = 2.0 to 5.0 volts).

A separate alarm messaging channel is provided across the Command Input/Alarm Output (A4) sub-interface as an 9600 bps channel demultiplexed from the optical signal originating from the microcell site Network Interface "B". This channel is bidirectional, message content is transparent to the network and conforms to EIA RS-485 specifications at Network Interface "A". The data received consists of 8 bits format with 1 start bit, 1 stop bit and no parity. This 9600 bps message channel is contained in the demultiplexed signal as described in Section 4.2.3. The alarm messaging channel packet format is as follows:

```
| SYNC   | MESSAGE LENGTH CHARACTER |  MESSAGE    | CHKSUM |
| (8 bits) |            (8 bits)            | (30-47 bytes) |  (8 bits)  |
```

The packet shall have a checksum that is the 8 bit sum of the message less SYNC and any ESC characters, ignoring the carryout of the higher corder bits. The SYNC shall have the unique value of 0B8h which identifies the beginning of a packet. The length of the packet is given by the message length character and is the number of additional bytes including the checksum.

The Service Port interface provides a RS-232 serial interface port operating at 9600 baud for the purpose of allowing the customer access to and control of Digital Microcell Connection Service monitoring, alarming, powering and operational status. The data transmitted and received consists of 8 bits format with 1 start bit, 1 stop bit and no parity. The packet protocol operating across this interface is identical to that specified for the alarm messaging channel described above. Message protocol and syntax specifications across the service port interface are provided in Appendix 1.

4.2.   Network Interface "B"

Network Interface "B", located at the Digital Microcell Connection Service microcell site, consists of a single physical interface with two sub-interfaces (B1 and B2) as indicated in Figure 1. The Optical Output (B1) sub-interface is an output from the Digital Microcell Connection Service Channel. The Optical Input (B2) sub-interface is an input to the Digital Microcell Connection Service channel.

4.2.1.   Physical

This interface employs one single connector to provide both the Optical Output (B1) and Optical Input (B2) sub-interfaces. Each sub-interface operates at a different optical wavelength across

a single-position fiber optic SC-type male connector, SCFOC/2.5 or equivalent as specified in Ameritech SC Connector Specification V.01.

4.2.2.   Optical

An optical signal is presented to the customer as an output from the Digital Microcell Connection Service channel via the Optical Output (B1) sub-interface as shown in Figure 1. This Optical Output (B1) sub-interface shares the same single physical interface with the Optical Input (B2) sub-interface specified below. Optical signal specifications for this sub-interface are defined in Table 5.

Table 5.

OPTICAL OUTPUT (B1) OPTICAL SPECIFICATIONS:
Optical Wavelength: 1550 ± 20 nanometers
Fiber: 9/125 Single Mode 8.3 micron diameter core nominal
Maximum Signal Level: + 5 dBm average

An optical signal is presented by the customer as an input to the Digital Microcell Connection Service channel via the Optical Input (B2) sub-interface as shown in Figure 1. This Optical Input (B2) sub-interface shares the same single physical interface with the Optical Output (B1) sub-interface above. Optical signal specifications for this sub-interface are defined in Table 6.

Table 6.

OPTICAL INPUT (B2) OPTICAL SPECIFICATIONS:
Optical Wavelength: 1310 ± 20 nanometers
Fiber: 9/125 Single Mode 8.3 micron diameter core nominal
Maximum Signal Level: +6 dBm average

4.2.3.   Modulation

Documentation is available from ADC Kentrox, a subsidiary of ADC Telecommunications, Inc. pursuant to the non-disclosure requirements of ADC Kentrox.

Contact: General Manager - Wireless Systems, ADC Kentrox, P.O. Box 10704, Portland, Oregon 97210-0704, Telephone (503) 643-1681

5.   ENVIRONMENTAL REQUIREMENTS

5.1.   Space

Space to house the network equipment provided at Network Interface "A" host site locations must be provided by the customer. The space requirements are specified in Table 7.

Table 7.

HOST SITE SPACE REQUIREMENTS:
Height: 16.8 inches
Width: 7.2 inches
Depth: 8.4 inches

5.2.   Temperature

The temperature of the network equipment located at Digital Microcell Connection Service host sites must be maintained within the limits specified in Table 8.

Table 8.

HOST SITE TEMPERATURE REQUIREMENTS:
Long Term: 0 $^\circ$C to +35 $^\circ$C

5.3.   Humidity

The humidity of the network equipment located at Digital Microcell Connection Service host sites must be maintained within the limits specified in Table 9.

Table 9.

HOST SITE HUMIDITY REQUIREMENTS:
Long Term: 10 to 95 percent Non-Condensing

6.   SERVICE PERFORMANCE SPECIFICATIONS

6.1.   Attenuation Distortion

Attenuation distortion shall nut exceed ± 3.0 dB between 824 and 894 MHz.

6.2.   Noise Contribution

The noise contributed by the network may be represented as a noise source, having a Power Spectral Density of -115 dBc/Hz, injected at the RF Input interfaces of the Digital Microcell Connection Service.

6.3.   Interrmodulation Distortion

Third order intermodulation distortion products will be limited and be at least 95 dB below the composite signal as measured by a traditional two-tone method.

7.   REFERENCES

1.   TR-NWT-000326 "Generic Requirements for Optical Fiber Connectors and Connectorized Jumper Cables" Issue 2, March 1991.

Telcordia (formerly Bellcore)

2.   Ameritech SC Connector Specification V.01

Any questions regarding this document, please contact the APEx Help Desk at 847-248-4328.

8.   APPENDIX 1 (Service Port Interface Message Protocol and Syntax)

8.1.   Purpose

The purpose of this Appendix is to specify the messaging protocols and syntax utilized across the Service Port (A5) sub-interface as shown and defined in AM TR-NIS-000117, Figure 1 and Section 4.1. A Service Port is provided at the host site for the purpose of allowing the customer access to and control of Digital Microcell Connection Service monitoring, alarming, powering and operational status.

8.2.   Service Port Transmission

Command and response information in the form of messages shall be sent between the user and the host site Digital Microcell Connection Service network equipment across the Service

ort (A5) sub-interface as an RS-232 serial port. The physical interface is specified in AM TR-NIS-000117, Section 4.1.1 and Table 2.

The data rate utilized is 9600 baud. The data shall be eight bit format with one start bit, one stop bit and no parity.

8.2.1.   RS232 Bus Transmission

The packet shall begin with an <STX> character and end with an <ETX> character. The data fields will be ASCII separated by a 1.

The typical message packet shall look like the following:

```
<STX>AMC|STAT 00|Mxx|Cxx|MCxx|Dmm/dd/yy|Thh:mm<ETX>
              CRUNLxx
              MAUNLxx
              MIUNLxx
              CMD | UNIT |
```

The Service Port messages describe in tabular form the acceptable values and formats of the packets of information.

8.2.2.   Service Port Messages

The following is a compilation of valid messages used on the Service Port. A message is a packet of information across the RS232 serial interface port. It can be one of three types.

```
1.  Command
    <STX>   AMC   |   CMDxx   |   Mxx   |   Cxx   |   MCxx   |   <ETX>
      8      8         40         24        24        32         8

2.  Request
    <STX>   AMC   |   CMDxx   |   Mxx   |   Cxx   |   MCxx   |   <ETX>
      8      8         40         24        24        32         8

3.  Acknowledgement
    <STX>   AMC   |   CMDxx   |   Mxx   |   Cxx   |   MCxx   |   <ETX>
      8      8         40         24        24        32         8
```

8.2.3. Field Definitions

The following is a compilation of the definitions of the fields in the orders and messages.

```
<STX>      -   Begin character (ascii 02)

AMC        -   Designates a microcell message

CNDxx      -   Command opcode
REQxx      -   Request opcode
ACKxx      -   Acknowledge opcode

STAT xx    -   Status value
CR    xx   -   Critical alarm number and value
MA    xx   -   Major alarm number and value
MI    xx   -   Minor alarm number and value

Mxx        -   MTSO number

Cxx        -   Cell Site number

MCxx       -   Microcell number

Dmmddyy    -   Date stamp
mm         -   month
dd         -   day
yy         -   year

Thh:mm
     hh
     mm


<ETX> End Character (ascii 03)
```

8.2.4.　Service Port Operating Commands

The following commands are sent on the Service Port. The following commands are sent to the Host Site Network Equipment by the User.

1) **Restart/Reset Command**

\<STX\>	AMC	|	CMD01	|	Mxx	|	Cxx	|	MCxx	\<ETX\>
8	8		40		24		24		32	8

2) **Startup Command**

\<STX\>	AMC	|	CMD02	|	Mxx	|	Cxx	|	MCxx	\<ETX\>
8	8		40		24		24		32	8

3) **Data/History Command**

\<STX\>	AMC	|	CMD03	|	Mxx	|	Cxx	|	MCxx	\<ETX\>
8	8		40		24		24		32	8

4) **Power Down Command**

\<STX\>	AMC	|	CMD04	|	Mxx	|	Cxx	|	MCxx	\<ETX\>
8	8		40		24		24		32	8

5) **Power Amplifier Adjust Command**

\<STX\>	AMC	|	CMD05	|	Mxx	|	Cxx	|	MCxx	|	POWER LEVEL	\<ETX\>
8	8		40		24		24		32		16	8

6) **Threshold Adjust Command**

\<STX\>	AMC	|	CMD06	|	Mxx	|	Cxx	|	MCxx	|	THRESHOLD	|	VALUE	\<ETX\>
8	8		40		24		24		32		16		16	8

7) **Status Command (1 response)**

\<STX\>	AMC	|	CMD07	|	Mxx	|	Cxx	|	MCxx	\<ETX\>
8	8		40		24		24		32	8

8) **Restart Status Command**

\<STX\>	AMC	|	CMD08	|	Mxx	|	Cxx	|	MCxx	\<ETX\>
8	8		40		24		24		32	8

9) **Main Service Standby Command**

\<STX\>	AMC	|	CMD09	|	Mxx	|	Cxx	|	MCxx	\<ETX\>
8	8		40		24		24		32	8

10) **Auxiliary Service Standby Command**

\<STX\>	AMC	|	CMD10	|	Mxx	|	Cxx	|	MCxx	\<ETX\>
8	8		40		24		24		32	8

11) **Set Time/Date Command**

\<STX\>	AMC	|	CMD11	|	Mxx	|	Cxx	|	MCxx	|	MMDDYY	|	HHMM	\<ETX\>
8	8		40		24		24		32		4		32	8

12) **History Command**

\<STX\>	AMC	|	CMD12	|	Mxx	|	Cxx	|	MCxx	\<ETX\>
8	8		40		24		24		32	8

8.2.5.   Service Port Requests

The following request is sent across the Service Port. This request is sent to the User by the Host Site Network Equipment.

```
1)  Startup Request
      <STX>   AMC  |  REQ01  |  Mxx  |  Cxx  |  MCxx   <ETX>
        8      8       40       24     24      32       8
```

8.2.6.   Service Port Acknowledgments

The following acknowledgments are sent across the Service Port in response to commands.
The following acknowledgments are sent to the User by the Host Site Network Equipment in re-
sponse to User commands.

1) **Restart/Reset Acknowledge**
   <STX>   AMC | ACK01 | Mxx | Cxx | MCxx   <ETX>
     8   8   40   24   24   32   8

2) **Startup Acknowledge**
   <STX>   AMC | ACK02 | Mxx | Cxx | MCxx   <ETX>
     8   8   40   24   24   32   8

3) **Data/History Acknowledge**
   <STX>| AMC | ACK03 | Mxx | Cxx | MCxx | DATA0 | DATA1 | . . . | DATAn   <ETX>
     8   8   40   24   24   32   16   16   16   8

4) **Power Down Acknowledge**
   <STX>   AMC | ACK04 | Mxx | Cxx | MCxx   <ETX>
     8   8   40   24   24   32   8

5) **Power Amplifier Adjust Acknowledge**
   <STX>   AMC | ACK05 | Mxx | Cxx | MCxx   <ETX>
     8   8   40   24   24   32   8

6) **Threshold Adjust Acknowledge**
   <STX>   AMC | ACK06 | Mxx | Cxx | MCxx   <ETX>
     8   8   40   24   24   32   8

7) **Status Acknowledge (1 response)**
   <STX>   AMC | ACK01 | Mxx | Cxx | MCxx | STATUS   <ETX>
     8   8   40   24   24   32   8-48   8

8) **Repeat Status Acknowledge**
   <STX>   AMC | ACK08 | Mxx | Cxx | MCxx | STATUS   <ETX>
     8   8   40   24   24   32   8-48   8

9) **Main Service Standby Acknowledge**
   <STX>   AMC | ACK09 | Mxx | Cxx | MCxx   <ETX>
     8   8   40   24   24   32   8

10) **Auxiliary Service Standby Acknowledge**
    <STX>   AMC | ACK10 | Mxx | Cxx | MCxx   <ETX>
      8   8   40   24   24   32   8

11) **Set Time/Date Acknowledge**
    <STX>   AMC | ACK11 | Mxx | Cxx | MCxx | MMDDYY | HHMM<ETX>
      8   8   40   24   24   32   48   32   8

12) **History Acknowledge**
    <STX>   AMC | ACK12 | Mxx | Cxx | MCxx
      8   8   40   24   24   32

```
|01 |02 |03 |04 |05 |06 |07 |08 |09 |10
|11 |12 |13 |14 |15 |16 |17 |18 |19 |20
|21 |22 |23 |24 |25 |26 |27 |28 |29 |30
|31 |32 |33 |34 |35 |36 |37 |38 |39 |40
|41 |42 |43 |44 |45 |46 |47 |48 <ETX>
```

```
                 .
                 .        ( 1 – 48 data captures in 30 min.
                 .              Increments)

   <STX>    AMC    |    ACK12    |    Mxx    |    Cxx    |    MCxx
     8       8           40            24          24          32

        | 01 | 02 | 03 | 04 | 05 | 06 | 07 | 08 | 09 | 10
        | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20
        | 21 | 22 | 23 | 24 | 25 | 26 | 27 | 28 | 29 | 30
        | 31 | 32 | 33 | 34 | 35 | 36 | 37 | 38 | 39 | 40
        | 41 | 42 | 43 | 44 | 45 | 46 | 47 | 48  <ETX>
```

8.2.7.   Service Port Message Descriptions

Service Port messages can be divided into three categories: commands, requests, and responses. Commands are issued from the User and wait for responses; requests are from the Host Site Network Equipment to the User for actions; acknowledgments are to the User and indicate that a command has been received and processed.

User Commands

1.   Restart/Reset Command

Physical reset of the alarm link.

physical reset of the alarm device.

2.   Startup Command

Establish communications between the User and Digital Microcell Host Site Network Equipment.

3.   Data/History/Status Command

Initiates an Alarm data response from a given microcell.

4.   Power Down Command

Powers off the Microcell and requires physically going to the Microcell to power the unit back up (Power Down during a Catastrophic Failure would help prevent further equipment damage).

5.   Power Amplifier Adjust Command

Adjusts the power level at the Microcell.

6.   Threshold Adjust Command

Adjusts the Alarm trip level at either the Host or Remote Microcell for alarm reporting.

7.   Status Command (1 response)

Initiates 1 status message which includes all Microcells connected to the Host Site Network Equipment.

8.   Repeat Status Command

(Multiple responses at timed intervals)

Initiates multiple status messages which includes all Microcells connected to the Host Site Network Equipment at the specified timed interval.

9.   Main Service Standby Command

Puts the Main Service module in standby mode.

10.   Auxiliary Service Standby Command

Puts Auxiliary service in standby mode.

11.   Set Time/Date Command

Sets time and date in Host Site Network Equipment for time and date stamp.

12.   History Command

Initiates an Alarm data response from a given Microcell.

Host Site Network Equipment Requests

1.   Startup Request

Requests a Startup command.

Host Site Network Equipment Acknowledgments

1.   Restart/Reset Acknowledge

Acknowledges the Restart/Reset command.

2.   Startup Acknowledge

Acknowledges the Startup command.

3.   Data/History/Status Acknowledge

Acknowledges the Data/History/Status command.

4.   Power Down Acknowledge

Acknowledges the Power Down command.

5.   Power Amplifier Adjust Acknowledge

Acknowledges the Power Amplifier Adjust command.

6.   Threshold Adjust Acknowledge

Acknowledges the Threshold Adjust command.

7.   Main Service Standby Acknowledge

Acknowledges the Main Service Standby command.

8.   Auxiliary Service Standby Acknowledge

Acknowledges the Auxiliary Service Standby command.

9.   Set Date/Time Command Acknowledge

Acknowledges the Time & Date command.

10. History Command Acknowledge

Acknowledges the History command.

8.2.8.   Command Message Data Locations

Description	Unit	Data Location
Digital Alarms Points		
Loss of Sync	Host	1
Clock Major	Most	2
Fan Failure	Host	3
Laser Shutdown	Host	4
MUX/DEMUX Loss of Frame	Host	5
Transceiver Major Alarm	Host	6
Transceiver Minor Alarm	Host	7
DTU Fan Failure	Host	8
MUX/DEMUX Major Alarm	Host	9
Main Transceiver Fail	Host	10
Auxiliary Transceiver Fail	Host	11
Transceiver Loss of Sync	Remote	12
Reserved	Remote	13
Fan Failure	Remote	14
Laser Shutdown	Remote	15
MUX/DEMUX Loss of frame	Remote	16
Off Hook Detect	Remote	17
Transceiver Major Alarm	Remote	18
DTU Fan Fail	Remote	19
MUX/DEMUX Major Alarm	Remote	20
Cutoff imminent	Remote	21
Facility Module Fan Failure	Remote	22
Facility Module Supply Fail	Remote	23
Facility Module AC Fall	Remote	24
Main Transceiver Failure	Remote	25
Auxiliary Transceiver Failure	Remote	26
Transceiver Minor Alarm	Remote	27
Remote Link Fail	Remote	28
Door Open Alarm	Remote	29
Housekeeping 1 Alarm	Remote	30
Housekeeping 2 Alarm	Remote	31
Housekeeping 3 Alarm	Remote	32
Analog Alarm Points		
Optical Power	Host	33
Five Volts	Host	34
Fifteen Volts	Most	35
Tx Laser Bias	Host	36
Optical Power	Remote	37
Five Volts	Remote	38
Fifteen Volts	Remote	39
Tx Laser Bias	Remote	40
PA Current	Remote	41
Facility Module Temperature	Remote	42
PA Heat Sink Temperature	Remote	43
Duplexer Reverse Power	Remote	44
PA Input Level	Remote	45
Facility Module DC Voltage	Remote	46
PA Output Level	Remote	47
Duplexer Forward Power	Remote	48

AMERITECH COMMAND/ALARMS

Host Site Equipment Commands

1) Restart/Reset Command.
     Format: <STX> AMC | CMD01 | C0109 | MC01 | <ETX>
     Acknowledges the Restart/Reset command.
     Format: <STX> AMC | ACK01 | C0109 | MC01 | <ETX>

2) Startup Command.
     Format: <STX> AMC | CMD02 | C0109 | MC01 | <ETX>
     Acknowledge the Startup command.
     Format: <STX> AMC | ACK02 | C0109 | MC01 | <ETX>

3) Data Command.
     Format: <STX> AMC | CMD03 | C0109 | MC01 | <ETX>
     Acknowledges the Data/History command.
     Format: <STX> AMC | ACK03 | C0109 | MC01

01	02	03	04	05	06	07	08	09	10
11	12	13	14	15	16	17	18	19	20
21	22	23	24	25	26	27	28	29	30
31	32	33	34	35	36	37	38	39	40
41	42	43	44	45	46	47	48	<ETX>

4) Power Down Command.
     Format: <STX> AMC | CMD04 | C0109 | MC01 | <ETX>
     Acknowledges the Power Down command.
     Format: <STX> AMC | ACK04 | C0109 | MC01 | <ETX>

5) Power Amplifier Adjust Command (adjusts 1-32).
     Format: <STX> AMC | CMD05 | C0109 | MC01 | <ETX>
     Acknowledges the Power Amplifier Adjust command.
     Format: <STX> AMC | ACK05 | C0109 | MC0132 <ETX>

6) Threshold Adjust Command (location 1-255, threshold 1-255).
     Format: <STX> AMC | CMD06 | C0109 | MC01 255 255 <ETX>
     Acknowledges the Threshold Adjust command.
     Format: <STX> AMC | ACK06 | C0109 | MC01 | <ETX>

7) Status Command.
     Format: <STX> AMC | CMD07 | C0109 | MC01 | <ETX>
     Acknowledges the Status command with an Alarm/Status message.
     Format: 45 REPT: ALM 109 01   00 GOOD STATUS
    06/27/93 07:45p

8) Repeat Status Command.
     Format: <STX> AMC | CMD08 | C0109 | MC01 | <ETX>
     Acknowledges the Repeat Status command with an Alarm/Status message.
     Format: 45 REPT: ALM 109 01   00 GOOD STATUS
    06/27/93 07:45p

9) Main Service Standby Command.
     Format: <STX> AMC | CMD09 | C0109 | MC01 | <ETX>
     Acknowledges the Main Service Standby command.
     Format: <STX> AMC | ACK09 | C0109 | MC01 <ETX>

10) Auxiliary Service Standby Command.
      Format: \<STX> AMC | CMD10 | C0109 | MC01 | \<ETX>
      Acknowledges the Auxiliary Service Standby command.
      Format: \<STX> AMC | ACK10 | C0109 | MC01 \<ETX>

11) Set Time/Date Command.
      Format: \<STX> AMC | CMD9 | C0109 | MC01 MMDDYY HHMM\<ETX>
      Acknowledges the Auxiliary Service Standby command.
      Format: \<STX> AMC | ACK9 | C0109 | MC01 \<ETX>

12) History Command.
      Format: \<STX> AMC | CMD12 | C0109 | MC01 | \<ETX>
      Acknowledges the Auxiliary Service Standby command.
      Format: \<STX> AMC | ACK12 | C0109 | MC01 \<ETX>

```
| 01   | 02   | 03   | 04   | 05   | 06   | 07   | 08   | 09   | 10
| 11   | 12   | 13   | 14   | 15   | 16   | 17   | 18   | 19   | 20
| 21   | 22   | 23   | 24   | 25   | 26   | 27   | 28   | 29   | 30
| 31   | 32   | 33   | 34   | 35   | 36   | 37   | 38   | 39   | 40
| 41   | 42   | 43   | 44   | 45   | 46   | 47   | 48   <ETX>
```

      .
      .   (1 – 48 data captures in 30 min.
                Increments)
      .

      \<STX> AMC | ACK12 | C0109 | MC01

```
| 01   | 02   | 03   | 04   | 05   | 06   | 07   | 08   | 09   | 10
| 11   | 12   | 13   | 14   | 15   | 16   | 17   | 18   | 19   | 20
| 21   | 22   | 23   | 24   | 25   | 26   | 27   | 28   | 29   | 30
| 31   | 32   | 33   | 34   | 35   | 36   | 37   | 38   | 39   | 40
| 41   | 42   | 43   | 44   | 45   | 46   | 47   | 48   <ETX>
```

Host Site Network Equipment Alarm message format.

The following example is for the Optical Transceiver and each field is separated by spaced.

All messages must end with a \031 \015 \012 octal or 0x19 0x0d 0x0a Hex.

Critical Alarm Format for the Optical Transceiver.

Severity (Critical)
       Minutes from Time Stamp
Report alarm
          Cell Site number
          Microcell number
          Alarm State
             Unit
             Unit Failure number
       Failure Description

C 45 DEPT: ALM 001 01 ACTIVE OT 01 HOST OTU FAILURE
06/27/93 07:45p
Date Time Stamp

Major Alarm Format for the Optical Transceiver.

Severity (Major)
       Minutes from Time Stamp
Report Alarm
          Cell Site number
          Microcell number
          Alarm State
             Unit
             Unit Failure number
       Failure Description

**   45 REPT;ALM 001 01 ACTIVE OT 01 HOST OTU FAILURE
06/27/93 07:45p
Date Time Stamp

Minor Alarm Format for the Optical Transceiver.

Severity (Minor)
      Minutes from Time Stamp
        Report Alarm
          Cell Site Number
            Microcell number
          Alarm State
            Unit
            Unit Failure number
      Failure Description

45 REPT:ALM 001 01 ACTIVE OT 01 HOST OTU ALARM
06/27/93   07:45p
Date Time Stamp

Alarm Clear Format for Optical Transceiver Alarm

Severity (Informational)
      Minutes from Time Stamp
        Report Alarm
          Cell Site number
            Microcell number
          Alarm State
            Unit
            Unit Failure number
      Failure Description

45 REPT:ALM 001 01 CLEAR OT 01 HOST OTU
06/27/93   07:45p

Critical Alarms

*C45 REPT:ALN 109 01 ACTIVE OT 01 HOST OTU FAILURE
06/27/93 07:45p

OT 01 - Loss of Sync
OT 02 - Laser Shutdown
OT 03 - Mux.Demux Loss of Frame
OT 04 - Mux/Demux Major

*C45 REPT:ALM 109 01 ACTIVE OT 01 REMOTE OTU FAILURE
06/27/93 07:45p

OT   01   - Loss of Sync
OT   02   - Laser Shutdown
OT   03   - Mux/Demux Loss of Frame
OT   04   - Mux/Demux Major

*CR 45 REPT:ALN 109 01 ACTIVE DT 01 HOST DTU FAILURE
06/27/93 07:45p

DT 01 – DTU General Failure.

*C45 REPT:ALM 109 01 ACTIVE DT 01 REMOTE DTU FAILURE
06/27/93 07:45p

DT 01 – DTU General Failure.

*C45 REPT:ALM 109 01 ACTIVE AT 01 HOST AUX DTU FAILURE
06/27/93 07:45p

DT 01 – AUX DTU General Failure.

*C45 REPT:ALM 109 01 ACTIVE AT 01 REMOTE AUX DTU FAILURE
06/27/93 07:45p

DT 01 – AUX DTU General Failure.

*C45 REPT:ALN 109 01 ACTIVE CI01 CUTOFF IMMINENT
06/27/93 07:45p

CI 01 – No AC Power/Low Battery Power Cutoff Imminent.

Major Alarms

**45 REPT:ALM 109 01 ACTIVE OT 05 HOST TRANSCEIVER FAILURE
06/27/93 07:45p

OT	05	-OTU 5 VDC Fail.
OT	06	-OTU 15 VDC Fail.
OT	09	-OTU Loss of Clock.

**4 REPT:ALM 109 01 ACTIVE OT 05 REMOTE TRANSCEIVER FAILURE
06/27/93 07:45p

OT 05 - OTU VDC Fail.
OT 06 - OTU VDC Fail.

**45 REPT:ALM 109 01 ACTIVE PA 01 PA FAILURE
06/27/99 07:45p

PA	01	-Remote PA Heat Sink Over Temp.
PA	02	-Remote PA Heat Sink Low Temp.
PA	03	-Remote PA Reserved.
PA	04	-Remote PA Under Current.
PA	05	-Remote PA Over Current.

**45 REPT:ALM 109 01 ACTIVE PA 06 LOW PA POWER ALARM
06/27/93 07:45p

**45 REPT:ALM 109 01 ACTIVE PA 07 HIGH PA POWER ALARM
06/27/93 07:45p

**45 REPT:ALM 109 01 ACTIVE LO 01 LOW OPTICAL POWER ALARM
06/27/93 07:45p

**45 REPT:ALM 109 01 ACTIVE HO 02 HIGH OPTICAL POWER ALARM
06/27/93 07:45p

**45 REPT:ALM 109 01 ACTIVE FM 01 FACILITY MODULE FAILURE
06/27/93 07:45p

FM 01 - Remote FM Cutoff Imminent.
FM 06 - Remote FM Over Temp.
FM 07 - Remote FM DCV Failure.

```
**45 REPT:ALM 109 01 ACTIVE LK 01 HOST LINK ALARM
06/27/93  07:45p
```

LK 01 – ACU to Host CityCell Failure
(ACU to Host APU).

```
**45 REPT:ALM 109 01 ACTIVE LK 01 REMOTE LINK ALARM
06/27/93  07:45p
```

LK 01 – Host CityCell to Remote CityCell Failure (Host APU to Remote APU).

```
**45 REPT:ALM 109 01 ACTAIVE DO 01 DOOR OPEN ALARM
06/27/93  07:45p
```

DO 01 – Remote CityCell Door is Open.

```
**45 REPT:ALM 109 01 ACTIVE BP 01 LOW BATTERY ALARM
0627/93  07:45p
```

BP 01 – Remote CityCell is on Battery Power.

Minor Alarm

*   45 REPT:ALM 109 01 ACTIVE FF 01 OTU FAN FAILURE
06/27/93 07:45p

*   45 REPT:ALM 109 01 ACTIVE FF 02 DTU FAN FAILURE
06/27/93 07:45p

*   45 REPT:ALM 109 01 ACTIVE FF 03 FM FAN FAILURE
06/27/93 07:45p

*   45 REPT:ALM 109 01 ACTIVE FM 00 FM AC FAILURE
06/27/93 07:45p

*   45 REPT:ALM 109 01 ACTIVE OT 07 HOST OTU ALARM
06/27/93 07:45p

OT 07 – OTU Minor Alarm
OT 08 – OTU Laser Bias Warning

*   45 REPT:ALM 109 01 ACTIVE OT 07 REMOTE OTU ALARM
06/27/93 07:45p

OT 07 – OTU Minor Alarm
OT 08 – OTU Laser Bias Warning

*   45 REPT:ALM 109 01 ACTIVE OT 08 HOST OTU ALARM
06/27/93 07:45p

*   45 REPT:ALM 109 01 ACTIVE OT 08 REMOTE OTU ALARM
06/27/93 07:45p

*   45 REPT:ALM 109 01 ACTIVE FM 04 FM HIGH TEMP ALARM
06/27/93 07:45p

*   45 REPT:ALM 109 01 ACTIVE HK 01 HOUSEKEEPING 1 REMOTE ALARM
06/27/93 07:45p

*   45 REPT:ALM 109 01 ACTIVE HK 02 HOUSEKEEPING 2 REMOTE ALARM
06/27/93 07:45p

*   45 REPT:ALM 109 01 ACTIVE OT 03 HOUSEKEEPING 3 REMOTE ALARM
06/27/93 07:45p

Clear Alarm and Keep Alive Status Formats

```
        45 REPT:ALM 109 01 CLEAR UN 00 DESCRIPTION OF ALARM
062/7/93  07:45p

UN ::= Unit Type OT/DT/C1/FM/PA/FF/DO/HK

        45 REPT:STATUS        0000 ON NORMAL
06/27/93  07:45p
```