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Software Product Description

PRODUCT: TeMIP Access Module for Lucent Autoplex® 1000   **SPD 70.42.00**

DESCRIPTION

TeMIP is a family of software products for the management of telecommunications and corporate networks, including fixed wire and mobile/cellular voice and data multi-vendor, multi-technology networks. TeMIP V3.2 provides comprehensive off-the-shelf fault and trouble management functions such as Alarm Handling, Event Logging and Trouble Ticketing for telecommunications network management.

TeMIP supports the International Standards Organization (ISO) management standards ISO 10164-x and ISO 10165-x, the OMNIpoint 1 standards as defined by NMF and T1M1. TeMIP and its features are applicable in the context of the International Telecommunication Union-Telecom Standard Sector (ITU-T) X.73x and Telecommunications Management Network (TMN) M.3010 and M.3100 Recommendations. It gives network operators a global view of their networks, and enables them to activate management functions and operations from single or multiple workstations.

TeMIP is built on top of the TeMIP Framework and fully benefits from the object oriented and truly distributed software architecture.

The TeMIP Autoplex Access Module (AM) is part of this program and provides an interface to the Autoplex System 1000 (software version: 10.0).

This Access Module supports fault management capabilities for AMPS technology, receiving and processing unsolicited messages.

SOLUTION COMPONENTS

The Autoplex 1000 MSC interoperates with TeMIP by means of a combination of Management Modules and integrated applications:
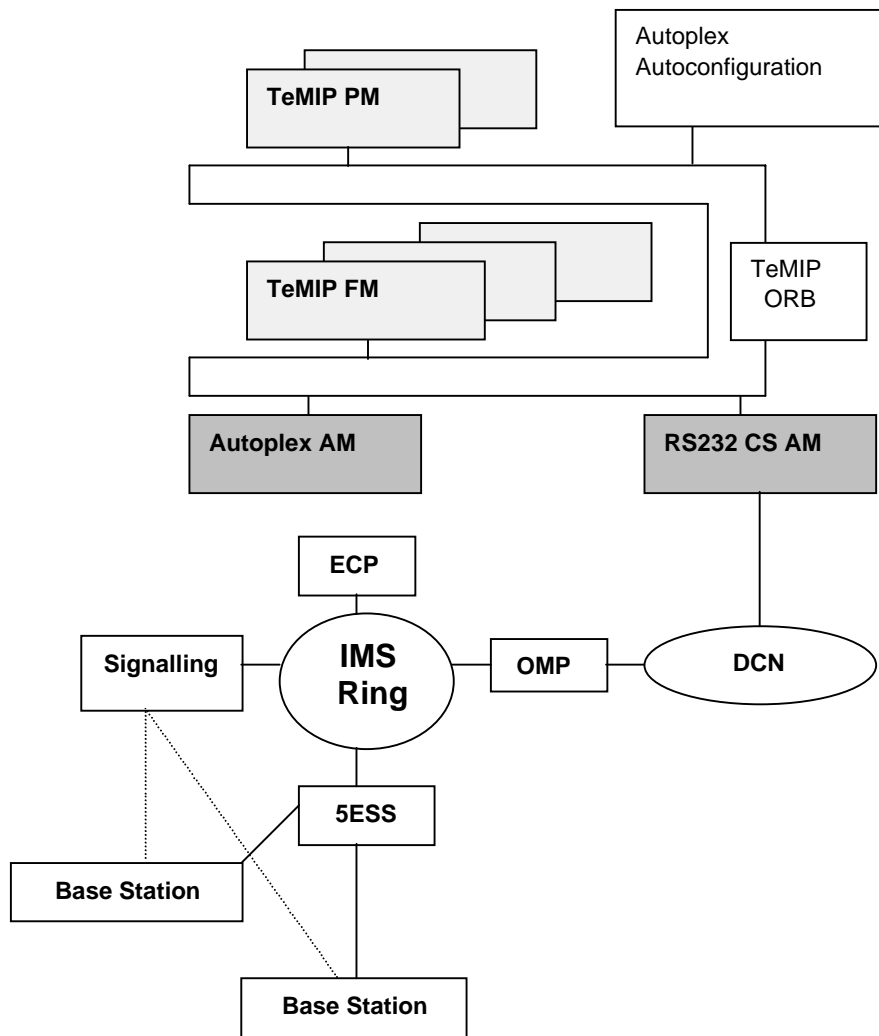
The RS232 Communication Server Access Module, responsible for establishing and maintaining the physical connection to the equipment.

The Autoplex AM is responsible for the Information Model representing the management capabilities of the equipment as well as all associated semantic translations between its ASCII-based messaging interface and TeMIP data models.

The Autoconfiguration Tool keeps the Management Information Repository (MIR) aligned with the real network element configuration, that is, TeMIP object instances are updated according to the actual switch state. The Autoconfiguration Tool is a TeMIP Launched Application.
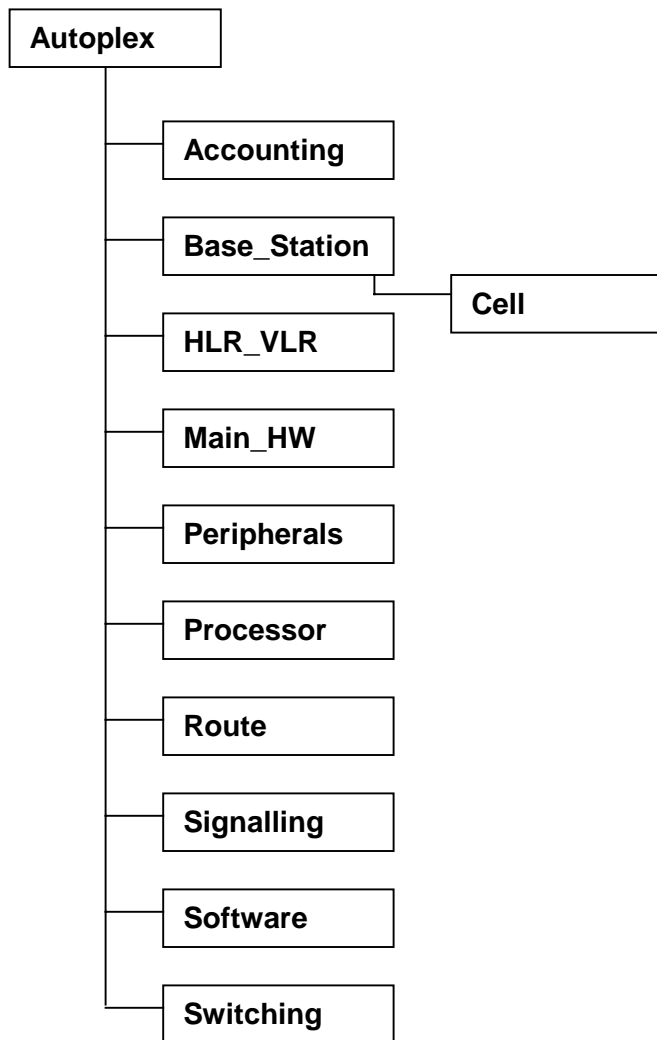
The solution components are shown in Figure 1.

Figure 1: Solution Components

```
                    ┌─────────────┐      ┌──────────────────┐
                  ┌─┤             │      │ Autoplex         │
                ┌─┤ │             │      │ Autoconfiguration│
                │ │ │ TeMIP PM    │      │                  │
                │ │ │             │      └──────────────────┘
                │ └─┤             │
                │   └──────┬──────┘
                │          │
          ┌─────┴──────────┴────────────────────┐
          │                                      │
          │   ┌──────────────┐          ┌────────┴──────┐
        ┌─┤ ┌─┤              │          │  TeMIP        │
      ┌─┤ │ │ │ TeMIP FM     │          │  ORB          │
      │ │ │ │ │              │          │               │
      │ │ │ │ │              │          └───────┬───────┘
      │ └─┤ │ └──────┬───────┘                  │
      │   └─┤        │                          │
      │     └────────┘                          │
   ┌──┴──────────────┐              ┌───────────┴─────────┐
   │  Autoplex AM    │              │   RS232 CS AM       │
   └────────┬────────┘              └───────────┬─────────┘
            │                                   │
      ┌─────────┐                               │
      │  ECP    │                               │
      └────┬────┘                               │
           │                                    │
 ┌──────────┐     ╱────────╲    ┌──────┐   ╱──────────╲
 │Signalling├─────┤  IMS    ├───┤ OMP  ├───┤   DCN    │
 └────┬─────┘     │  Ring   │   └──────┘   ╲──────────╱
      │ ╲         ╲────┬────╱
      │   ╲            │
      │     ╲     ┌─────────┐
 ┌────┴────────┐  │  5ESS   │
 │Base Station │  └────┬────┘
 └─────────────┘       │
            ╲          │
         ┌───────────────┐
         │ Base Station  │
         └───────────────┘
```

INFORMATION MODEL OUTLINE

The Autoplex is represented by the Information
Model shown in Figure 2.

Figure 2 Information Model

```
┌──────────────┐
│  Autoplex    │
└──────────────┘
       │
       │    ┌──────────────┐
       ├────│ Accounting   │
       │    └──────────────┘
       │
       │    ┌──────────────┐
       ├────│ Base_Station │
       │    └──────────────┘
       │            │    ┌──────────┐
       │            └────│  Cell    │
       │                 └──────────┘
       │    ┌──────────────┐
       ├────│ HLR_VLR      │
       │    └──────────────┘
       │
       │    ┌──────────────┐
       ├────│ Main_HW      │
       │    └──────────────┘
       │
       │    ┌──────────────┐
       ├────│ Peripherals  │
       │    └──────────────┘
       │
       │    ┌──────────────┐
       ├────│ Processor    │
       │    └──────────────┘
       │
       │    ┌──────────────┐
       ├────│ Route        │
       │    └──────────────┘
       │
       │    ┌──────────────┐
       ├────│ Signalling   │
       │    └──────────────┘
       │
       │    ┌──────────────┐
       ├────│ Software     │
       │    └──────────────┘
       │
       │    ┌──────────────┐
       └────│ Switching    │
            └──────────────┘
```

The meaning of each class is described in Table 1.

Table 1: Autoplex Class Description

Class	Description	Cardinality
Autoplex	This represents the MSC itself.	N
Accounting	Exchange accounting (billing) subsystem.	1
Base_Station	Remote station that contains the Radio Units responsible for subscriber unit connection.	N
Cell	Base Station sectors.	1 or 3
HLR_VLR	Home Location Register – Visitor Location Register: alarms related to subscriber database register.	1
Main_HW	Main Hardware – alarms related to the exchange hardware.	1
Peripherals	I/O processor, and all other I/O equipment (disk, printer, terminal, tape).	1
Processor	Call processor, and all other processors, except SS7 and I/O.	1
Route	Group of all routes logically programmed in the switch.	N
Signalling	Signalling system: CCITT7, ISUP, IS41, and proprietary.	N
Software	Alarms related to software (for example, files system full ...).	1
Switching	Switching Network – hardware parts responsible for call switching.	1

MANAGEMENT CAPABILITIES SUMMARY

Unsolicited Messages Support

The Autoplex AM can handle **all** unsolicited messages with any level of severity sent by the switch, that is, all alarm types (or ***message names***) with severity critical, major or minor, sent by the switch will be captured by TeMIP. A few message names with no severity are discarded by the Autoplex AM. However, because not all alarms are relevant or usual, the Autoplex AM maps messages to the ITU-T Standards with various levels of detail. Usual messages are carefully mapped to the Standards, while unusual messages are roughly mapped to default values. The proprietary alarm message is always present in the Additional Text field for both Usual and Unusual messages. According to the Autoplex AM way of selecting messages, there are three disjointed sets of messages: Usual, Unusual and Discarded. Figure 3 shows the relationship between the message severity and the Autoplex AM mappings.

Figure 3: Autoplex AM Selected Messages Diagram
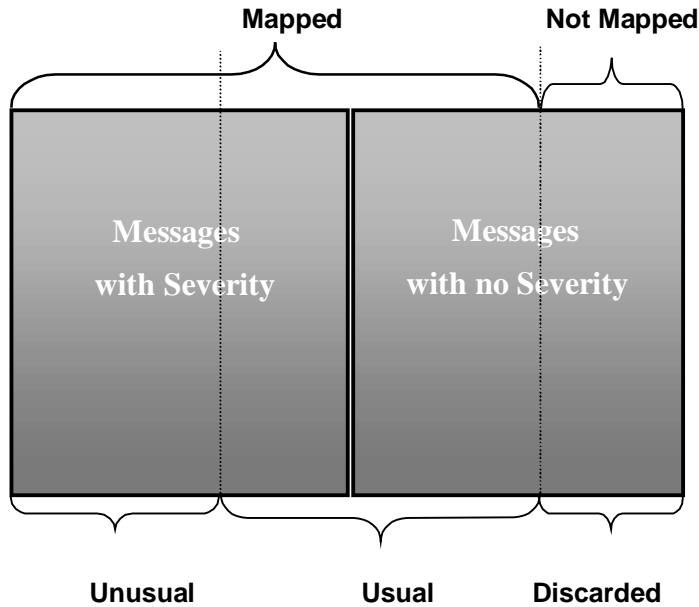
Usual Messages

This category includes the most recurrent and most important alarms. These alarms are carefully mapped to the ITU-T Standards and are shown in Table 2.

The criteria used to include a message in this category are:

- **Alarm Severity:** All critical, major and minor AUD message names are included. All critical, major and minor REPT message names are also included, except those listed at the end of Table 2. Some other types with severity critical, major, minor, M (Manual Requested Message) and A (Action message) are also included, along with clearance alarms for these alarms, if available from the switch.

- **Frequency:** The most recurrent alarms during regular operation of the MSC as well as the ones that occur under common maintenance activities are included.

- **Importance:** The most important alarms are included (that is, those which if not reported could cause major losses to the network and which could affect the quality of service).

- **Alarm Type:** Most Usual Messages are alarms of the type REPT.

Unusual Alarms

This category includes alarms that cannot be categorised as "Usual", but which have some sort of severity (critical, major or minor).

Discarded Alarms

This category includes alarms that cannot be categorised as "Usual" or "Unusual". Only certain alarms with no severity are in this category.

Alarm Clearance

Several unsolicited messages have a correlated clearance alarm. For these messages, the Autoplex AM generates the necessary information (Notification Id or Specific Problem) so that the correct alarm correlation can be performed.

TeMIP correlates alarms according to the following rules:

1. If the clearance alarm provides a value for the Correlated Notification Identifier, all alarms that have the same Managed Object instance and Notification Identifier (as the Correlated Notification Identifier) are cleared.

2. If the clearance alarm does not provide a value for the Correlated Notification Identifier, all alarms that have the same Managed Object instance, Probable Cause, Event Type and Specific Problem (as the values provided in the clearance alarm) are cleared.

The Autoplex AM uses both rules to perform alarm correlation. All message names use rule number two except the REPT CELL ALARM SCANNING message name and all message names beginning with RMV or RST. In these cases, the Autoplex AM builds a Notification Identifier that allows correct alarm correlation for different alarm message groups such as LAC, ICLA, PRIMARY FRAME, GROWTH FRAME, OTU, VOICE RADIO, HSD, LN, DFC, RPCN,

SBUS. This feature keeps the Management Model simple (fewer object classes) and allows correct alarm correlation for different instances of the groups mentioned above, even if they are not represented as classes in the model.

Support for User Defined Cell Site Alarms (UDA)

The Autoplex 1000 allows each Service Provider to change the alarm text that appears in the REPT CELL ALARM SCAN for environmental alarms such as fire, intrusion, temperature, power plant, and so on. This feature is known as User Defined Cell Site Alarms (UDA) and is described in the *Autoplex 1000 User-Defined Cell Site Alarms Manual.*

The Autoplex AM supports this facility by maintaining a table in the AM Customization that can be easily adjusted to comply with the definitions required by a Service Provider. By default, this table implements the alarm texts that are described in the REPT CELL ALARM SCAN message name, described in the *Autoplex 1000 Output Messages Manual.*

Alarm Information

Table 2 lists the Autoplex alarm messages which are handled by the AM and described in *the Autoplex 1000 Output Messages Manual*.

Table 2 Autoplex Alarm Table

	MESSAGE NAME
1	AUD CNC (#4)
2	AUD LKBDST (#4)
3	AUD NODEST(#4)
4	CMPR MHD (#2 A #5)
5	CMPR MHD (#6)
6	COPY DIFF SRC (#2 A #5)
7	COPY DIFF SRC (#6)
8	EXC OFLBOOT (ABORTED, STOPPED, TERMINATED)
9	EXC OFLBOOT (COMPLETED)
10	INIT MHD (ABORTED, ERROR, NOT STARTED, STOPPED)
11	INIT MHD (#2, #3)
12	OP ACDN OVLD
13	OP AMA DISK FULL
14	OP AUD
15	OP CDN OVLD
16	OP CELL
17	OP CELL RA
18	RCVRY CELL PHASE (COMPLETED)
19	RCVRY CELL PHASE (SUSPENDED, TIMEOUT)
20	RCVRY CELL REMOVED
21	RCVRY DCS UNAVAIBLE
22	REPT ACDN (DROPPED, SWITCHED TIME OUT)

23	REPT ACDN (ESTABLISHED)
24	REPT ADP (#2)
25	REPT ADP (#3)
26	REPT AMA DISK FULL
27	REPT AMA DISK READER
28	REPT AMA DISK WRITER ERROR
29	REPT AMA DISK WRITER FAULT
30	REPT AMA DISK WRITER TERM CODE
31	REPT AMA FILES
32	REPT AMA LONG DURATION CALL CDN
33	REPT AMA SESSION CONNECT FAIL
34	REPT AMA SESSION TERM
35	REPT AMATAPE ERROR
36	REPT CALL FORWARDING DEACT
37	REPT CDN ASSERT
38	REPT CDN DIGIT ANALYSIS DEFENSIVE
39	REPT CDN DIGIT ANALYSIS DIGIT
40	REPT CDN EXCEPTION
41	REPT CDN IMS ERROR DETECTED
42	REPT CDN OSDS RECOVERY DEFENSIVE
43	REPT CDN SINGLE BIT MEMORY
44	REPT CDN STATUS
45	REPT CELL
46	REPT CELL ALARM SCAN
47	REPT CELL AUTOMATIC

48	REPT CELL CSC SFW
49	REPT CELL DL
50	REPT CELL DL CONNECTED
51	REPT CELL DL FAIL
52	REPT CELL DS1 UNIT ALARMED
53	REPT CELL DS1 UNIT RESTORED
54	REPT CELL HEH
55	REPT CELL PEAR
56	REPT CELL RA OOS
57	REPT CELL REVERSE CONTROL CHANNEL (ALARMED)
58	REPT CELL REVERSE CONTROL CHANNEL (NORMAL)
59	REPT CFT LIB
60	REPT CFTSHL (#8)
61	REPT CFTSHL (#12)
62	REPT CFTSHL (#11, #13)
63	REPT CNCE
64	REPT CNIINIT (#17)
65	REPT CNIINIT (#18)
66	REPT CP CANNOT ACCESS
67	REPT CTRC
68	REPT CTRC ORIG
69	REPT CTRC TERM
70	REPT CU (ACTIVE, STANDBY)
71	REPT CU (INITIALIZING, OUT OF SERVICE, UNAVAIABLE)
72	REPT CU (#2, #3)
73	REPT DATABASE CDN INVALID
74	REPT DATABASE RGDB 100% FULL
75	REPT DB INIT
76	REPT DCI ACTIVE
77	REPT DCI OOS
78	REPT DCS CC
79	REPT DCS CC DCIU RECOVERY
80	REPT DCS CP FAILURE
81	REPT DCS DLN
82	REPT DCS DS1 UNIT ALARM
83	REPT DCS DS1 UNIT RESTORED
84	REPT DCS DSN
85	REPT DCS DSN SESSION (DOWN, FAILED TO CONNECT)
86	REPT DCS DSN SESSION (ESTABLISHED)
87	REPT DCS TRKGRP
88	REPT DFC
89	REPT DKDIP
90	REPT DLGSHL
91	REPT DLN ASSERT
92	REPT DYNAMIC ROUTING WARNING
93	REPT EAI
94	REPT ECP (SESSION DOWN)
95	REPT ECP (SESSION ESTABLISHED)
96	REPT ECP ASSERT
97	REPT ECP CLOCK SYNC (#3, #4)
98	REPT ECP ICN SESSION
99	REPT ECP OFFICE ALARM SCAN POINT (#1)
100	REPT ECP OFFICE ALARM SCAN POINT (#2)
101	REPT ERROR
102	REPT ERSLOT (#18)
103	REPT FAN (#7)
104	REPT FAN (#8)
105	REPT FAN MULTI (#1)
106	REPT FAN MULTI (#2)
107	REPT FAN SINGLE (#1)
108	REPT FAN SINGLE (#2)
109	REPT FAP (#9)
110	REPT FEPCFAIL DCS TRK MEM
111	REPT FILESYS
112	REPT FUSE ALARM (#1)
113	REPT FUSE ALARM (#2)
114	REPT IMSDRV AUD
115	REPT IMSDRV INIT(#1, #3, #5)
116	REPT IMSDRV INIT(#2)
117	REPT INHADM
118	REPT INHIBIT
119	REPT INTER MSC NETWORKING OUTAGE
120	REPT LN
121	REPT LN QUEUE OVERLOAD
122	REPT LS SESSION (DOWN)
123	REPT LS SESSION (ESTABLISHED)
124	REPT MHD
125	REPT MOP
126	REPT MRVR
127	REPT MSDC FLT
128	REPT MT
129	REPT OFFLINE
130	REPT OFLBOOT
131	REPT OMP CLOCK
132	REPT OMP DATALINK
133	REPT OOS LIMIT EXCEEDED
134	REPT OP RTM FLT
135	REPT PASSWORD
136	REPT PHASE
137	REPT POWER (#3)

138	REPT PSDO_UMS.P FLT
139	REPT REX UNABLE
140	REPT RING CFR (#1)
141	REPT RING CFR (#2 A #15)
142	REPT RING GROWTH (#1 A #9, #11, #12, #16, #20)
143	REPT RING INIT (#2, #7, #9)
144	REPT RING INIT (#3, #4, #5, #6)
145	REPT RING TRANSPORT ERR
146	REPT RPC STAT
147	REPT SERVICE MEASUREMENTS FILE SMD
148	REPT SERVICE MEASUREMENTS FILES
149	REPT SIMCHK
150	REPT SOP
151	REPT SYSTEM
152	REPT TDTP </PRC/CDZ> FLT
153	REPT TI OUTPUT DATABASE ERROR
154	REPT TI OUTPUT FILE ACCESS ERROR
155	REPT TI OUTPUT PROCESSING ERROR
156	REPT TI OUTPUT PROCESSOR IMS ERROR
157	REPT TI OUTPUT THROTTLE CHANGE (1)
158	REPT TI OUTPUT THROTTLE CHANGE (2, 3)
159	REPT UDPC
160	REPT UNIX INIT
161	RMV DFC (ABORTED, STOPPED)
162	RMV HSD (#2, #3)
163	RMV LN (ABORTED, STOPPED)
164	RMV RPCN (ABORTED, STOPPED)

165	RMV SBUS (ABORTED, ERROR, NOT STARTED, STOPPED)
166	RST DFC (ABORTED, ERROR, NOT STARTED, STOPPED)
167	RST DFC (COMPLETED)
168	RST HSD (#1)
169	RST HSD (#2, #3)
170	RST LN (ABORTED, STOPPED)
171	RST LN (COMPLETED)
172	RST RPCN (ABORTED, STOPPED)
173	RST RPCN (COMPLETED)
174	RST SBUS (ABORTED, ERROR, NOT STARTED, STOPPED)
175	RST SBUS (COMPLETED)
176	STOP OFLBOOT (ABORTED, STOPPED)
177	SW OFLBOOT (ABORTED, STOPPED)
178	VFY FILE (#6 A #37)
179	VFY MHD (ABORTED, ERROR, NOT STARTED, STOPPED)
180	VFY MHD (#2, #3)
	MESSAGES NOT MAPPED
	REPT CONFIG RECONFIGURATION
	REPT DCS DL FAILURE
	REPT ECP DL FAIL
	REPT FAN (#2)
	REPT FAN (#5)
	REPT HSD (#2)
	REPT SCC (#4)
	REPT SDL (#2)
	REPT TRBL THRESH EXCEEDED

COMMAND SUPPORT

The Autoplex AM implements commands to establish and release a connection between the OMP and TeMIP. These commands perform a UNIX login on the OMP followed by the activation of a sequence of actions that cause the OMP to start sending autonomous messages.

- **Login:** When the user selects the Login command from the Operator selection he or she is prompted to enter the OMP account username and password. The login command initiates a login on the OMP and calls the *ITlogviewer* application, which begins to send unsolicited messages.

- **Logout;** The Logout command closes the *ITlogviewer* application and logs out from the OMP.

MISCELLANEOUS MANAGEMENT CAPABILITIES

Radio to Cell Correlation

This feature of the Autoplex AM provides easy visualisation of a coverage area that could be affected by one or more fault Radio Units in the Base Station.

The Autoplex 1000 does not implement the concept of CELL (or Sector) in its message formats. All alarms that could affect the coverage area of a CELL are (in their proprietary format) reported to a specific Radio Unit that belongs to the CELL.

The Autoplex AM, on the other hand, implements the concept of CELL. The behavior of the Autoplex AM when receiving an alarm from a Radio Unit is to map the Managed Object Instance as the CELL that contains the Radio Unit.

To do so, the Autoplex AM keeps an attribute in the CELL instance that identifies the relationship between Radio Units and CELLs. The Autoconfiguration Tool automatically updates these attributes for every CELL.

Because the Autoplex 1000 switch itself does not support the concept of CELL, the Autoconfiguration tool creates CELL instances with the pre-assigned names ALPHA, BETA and GAMA for Sectorized Base Stations or OMNI for Omnidirectional Base Stations.

Autoconfiguration Tool

The Autoconfiguration Tool allows alignment of TeMIP object instances with switch information itself. The Autoconfiguration Tool queries the switch - more specifically the OMP and the ECP - about the current state of the MSC components and updates the MIR by creating new instances, deleting non-existent instances or by setting instance attributes to new values.

The Autoplex AM Object Instance alarm mapping conforms with the naming convention used by the Autoconfiguration Tool.

The Autoconfiguration Tool is a Launched Application. During regular operation it should be run once a day, due to the dynamic environment of a Cellular Service Provider. It is effective not only during regular operation but also for initial setup and configuration.

- The Autoconfiguration Tool creates instances for the following Object Classes:

    Base_Station, Cell, Route, and Signalling.

Instances of the Cell Class are created according to Base Station type, that is, an Omni Base Station will automatically create one OMNI Cell instance and a sectorized Base Station will automatically create three Cell instances named ALPHA, BETA and GAMA.

Object instances of types SS7 link and SS7 link set are created to monitor the IS41 network, and base station links are created to monitor the proprietary links between the DCS (5ESS) and the Base Stations. These object instances belong to the Signalling Object Class.

- The Autoconfiguration Tool deletes instances of the following Object Classes:

    Base_Station, Cell, Route, and Signalling.

- The Autoconfiguration Tool updates instances of the following Object Classes:

    Base_Station, Cell, and Signalling.

Cell instances update the attribute that controls the setting of Radio Units belonging to that particular Cell. Signalling instances of type SS7 update the attribute that helps to find the Far End Point of the signalling link or linkset. Base Station is set according to the type, that is, OMNI or SECTORIZED.

HARDWARE REQUIREMENTS

Supported Alpha AXP Processors:

AlphaServer 8200
AlphaServer 8400
DEC/4600, DEC/4700
DEC/7600, DEC/7700
DEC/10600

AlphaServer 2000
AlphaServer 2100
AlphaServer 4000
AlphaServer 4100
AlphaStation 600
DEC/3500, DEC/3500S, DEC/3500X
DEC/3800, DEC/3800S
DEC/3900

AlphaServer 300 (Melmac)
AlphaServer 400
AlphaServer 800

AlphaServer 1000
AlphaStation 200
AlphaStation 250
AlphaStation 255
AlphaStation 400
AlphaStation 500
DEC/2300S
DEC/2500
DEC/3300, DEC/3300L,
DEC/3300X, DEC/3300LX
DEC/3400, DEC/3400S
DEC/3600, DEC/3600S
DEC/3700

PWS 433
PWS 500
PWS 600

Ultimate Workstation 533

Disk Space Requirements:

Disk space required for installation:
Subset copy: 22,000 Kbytes
Installation: /usr 78,000 Kbytes

Disk Space Required for Use (Permanent):
No specific requirement

Memory Requirements:

The minimum memory supported, due to a TeMIP Framework prerequisite, is 128 Mbytes. However, the use of this software in conjunction with increased memory capability improves performance.

SOFTWARE REQUIREMENTS

DIGITAL UNIX Operating System V4.0D
TeMIP Framework V3.2
Tcl 8.0 or newer version
Tk 8.0 or newer version
Expect 5.25 or newer version
wermit

OPTIONAL SOFTWARE

TeMIP Graphical ASCII Toolkit V2.0.

GROWTH CONSIDERATIONS

The minimum hardware/software requirements for any future version of this product may be different from the current version requirements.

YEAR 2000 READY

This product is Year 2000 Ready.

The testing used to confirm the Year 2000 readiness of this product included code assessment and system tests to verify transition dates.

DISTRIBUTION MEDIA

This software is available by electronic means, distributed directly by the Engineering Team in NSIS/CIS Telecom, contactable through your local DIGITAL office, which sends an internal e-mail to vbetemipsupp@digital.com (containing customer identification and proof of license purchase).

ORDERING INFORMATION

TeMIP Access Module for Lucent Autoplex 1000

Software License: QL-66QA9-AA

Software Product Services: QT-66Q**-**

Notes:

1. * denotes variable fields. For additional information on available services, or hardware platform tiers, refer to the appropriate price book.

2. The QL number corresponding to the TeMIP Graphical ASCII Toolkit V2.0 (Run-Time) must also be purchased (QL-5SMAM-3B).

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