COMPAQ

Software Product Description

PRODUCT NAME: Compaq TeMIP Version 4.0 for Tru64 Unix SPD 54.17.08

DESCRIPTION

TeMIP V4.0 is a complete, distributed, prepackaged Product Family management system for multivendor, multi-protocol networks. It provides access to, and management functions for, open networks and the network environments of Compaq (TCP/IP, DECnet-Plus and DECnet Phase IV). TeMIP is a modular and distributed software product that can be extended through the addition of other TeMIP products, third party, or user-developed software modules.

The TeMIP distribution features enable users to transparently distribute access at user level through Client systems, and at Network Element level through Access Module server systems. TeMIP distribution provides the scalability and geographical span requirements of telecommunication or corporate networks by sharing the communication traffic and CPU load over multiple geographically disseminated systems.

In addition to its distributed framework, the TeMIP product set provides telecommunication and large voice/data network management capabilities through the following TeMIP Fault Management applications and Development Toolkits:

- **TeMIP Alarm Handling**, for the management of ISO-formatted alarms (a specific type of event in ISO terminology), enables users to define comprehensive alarm filtering and low level correlation, real-time monitoring and recording of alarm information.
- **TeMIP Event Logging**, enables users to define single or multiple collection and recording of events for a domain that represents the entire or selected portions of the network.
- **TeMIP Trouble Ticketing**, enables the initiation and efficient coordination of network problem solving and maintenance activities.

For more information about the TeMIP Fault Management applications, refer to the TeMIP Fault Management Software Product Description (SPD) 45.24.xx.

- The **TeMIP OSI Management Toolkit** allows a TeMIP management system to act as either a Manager, using the OSI Access Module, or as an Agent using the OSI Agent Presentation Module. The toolkit provides access to the Open Systems Interconnection (OSI) Q3/CMIP environment in accordance with Telecommunications Management Network (TMN) recommendations. It provides the means to maintain and manage the Guidelines for the Definition of Managed Objects (GDMO) models of managed objects and integrate them into the TeMIP run-time environment without recompilation. It uses the standard and commercially available XMP API to access the TMN Q3 stack. For more information, refer to the TeMIP OSI Management Toolkit Software Product Description (SPD 51.28.xx).
- The **TeMIP Graphical ASCII Toolkit** (GAT) provides access to elements that do not support the standard management interface, but which still use ASCII/TL1 type messages (that is, legacy systems and applications). For more information, refer to the TeMIP Graphical ASCII Toolkit Software Product Description (SPD 64.82.xx).
- The **TeMIP Expert System Access** (ESA), which provides external Expert System applications with access to TeMIP. Note that ESA is independent of any proprietary Expert System technology and provides a consistent interface to the Expert System application. As a result of this, the application gateway can develop in line with TeMIP. For further information, refer to the TeMIP Expert System

Access Software Product Description (SPD 70.40.xx).

- The TeMIP CORBA Toolkit is a component of the TeMIP product set that provides a TeMIP-based management system with CORBA Client capabilities. This component is a toolkit (not a self-contained executable program) that provides the basic building blocks for customizing and building TeMIP Access Modules (AMs) accessing CORBA objects by means of an Object Request Broker (ORB). In order to guarantee interoperability with any CORBA Server, the inter-ORB communication protocol known as IIOP (Internet Inter-ORB Protocol) is used.

  The toolkit relies on the ORB known as *ORBIX 3.0.1* belonging to the company IONA. *ORBIX 3.0.1* is compliant with the CORBA 2.0 standard. For further information, refer to the TeMIP CORBA Toolkit Software Product Description (SPD 80.32.xx).

- The **TeMIP CORBA Agent** is a component of the TeMIP product set that provides a general access mechanism to the TeMIP platform through the widely accepted and available CORBA communication middle-ware technology. General access means that access can be gained to any kind of TeMIP object. A coarse grain and generic CORBA interface is provided so that any TeMIP call request can be passed through a fixed set of CORBA IDL operations. The TeMIP CORBA Agent provides secure access based on the CORBA standard using the ORBIX Secure Socket Layer (SSL). Authentication, integrity and confidentiality can be guaranteed for all communications between the TeMIP CORBA Agent client applications and the TeMIP platform.

  There is no constraint imposed on TeMIP CORBA Agent client applications regarding the programming language and the OS/Platform. For further information, refer to the TeMIP CORBA Agent Software Product Description (SPD 80.28.xx).

- The **Internet SNMP Toolkit** (IST) is part of the TeMIP Framework and provides the TeMIP platform with access to telecommunication equipment that supports standardized SNMP management interfaces. The Internet SNMP Toolkit V4.0 consists of three main components:

  - The SNMP AM component provides management information and protocol mapping between the SNMP world and the OSI-based TeMIP world. This provides:

    1. Mapping between the SNMP naming (identification) of managed objects, and the TeMIP naming (identification) of Entities
    2. Mapping between SNMP protocol operations and TeMIP management directives
    3. Mapping between SNMP objects (scalars/tables) and the TeMIP entity model
    4. Mapping between SNMP network events (traps), and TeMIP OSI Events and Alarms.

  Note that the SNMP AM component relies on the TeMIP Synonym Services (see the “Naming Enhancements” section).

  - The MIB translator utility (MTU) translates SNMP MIBs into a TeMIP management model describing the mapping rules to be applied between the SNMP world and the TeMIP world.
  - The IP Poller FM component monitors the reachability of IP entities, by polling these entities at regular intervals and notifying any change in the reachability status.

  The main IST concepts are:

  - Clear separation of the model representing the equipment managed through the SNMP agents, and the configuration model enabling communication with these SNMP agents
  - Full support of SNMP agents, whether they implement standard or de-facto interfaces to the SNMP protocol
  - Customizable mapping, by providing the user with complete control over:

    1. Modeling aspects (flexible hierarchical mapping)
    2. Translation of SNMP traps into OSI Events/Alarms

  - Open TeMIP environment to 3rd party applications, thus allowing easy integration of SNMP-speaking applications within TeMIP

  From Version 4.0, this toolkit replaces the TCP/IP AM SNMP Toolkit. The TCP/IP toolkit is still packaged with the product in order to allow a smooth migration path from TeMIP V3.2 to TeMIP V4.0 for applications using the SNMP services.

  In addition to the features offered by the previous toolkit, the new toolkit provides the following features:

  - Support of multiple IP Addresses: an equipment can be reached using several IP addresses
  - Tuning of network parameters: adjustment of udpport/timeout/retries per agent
  - Support of proxy agents, in particular the ability to discriminate traps emitted by proxy agents
  - Support of wildcard requests to SNMP multi-index tables

- Configuration of the agent port number, which the remote agent listens to
- Configuration of the SNMP Version, to indicate which version is supported by the agent
- Support of SNMP V3 at PDU level
- Customized model mapping between the TeMIP and SNMP world
- Mapping of targeted entity, based on a powerful trap instance-managed object mapping
- Configuration of the SNMP Trap port number the SNMP AM listens to
- Trap dispatching: the ability to dispatch traps towards several applications, including the SNMP AM
- Traceability of the SNMP traffic processed by the SNMP AM
- Full support of SNMP MIB import mechanism

NAMING ENHANCEMENTS

Naming enhancements are provided in TeMIP V4.0 through the Synonym Services. This new key feature provides an appropriate design for simplifying and generalizing the name translation issues that exist at the boundaries of the TeMIP environment. This includes user interfaces and gateways that export and import named identifiers from external applications into TeMIP

All the objects managed by TeMIP are identified by a structured name that reflects the hierarchical approach defined for TeMIP names. In order to increase flexibility, user-friendliness, and openness, “synonyms” are proposed for use as simple application-specific names:

- The **ASCII synonym** service provides a flexible alternate representation of a TeMIP Entity Specification that does not comply with the TeMIP naming principles. Several but different ASCII synonyms can be associated with the same TeMIP Entity Specification through a *naming plane* managed by each application.

  The ASCII synonym service is an optional feature that can be configured for each management module participating in the TeMIP system.

- The **IP Synonym** service allows translation of the source entity, without ambiguity, into a single TeMIP entity using the IP address and Trap community. The way SNMP names and address identifiers are mixed in the absence of an extensive and thorough naming scheme, requires the translation of those identifiers or combinations of identifiers and addresses into unique TeMIP names. The V4.0 SNMP AM stores SNMP addressing information related to a TeMIP SNMP entity as IP Synonyms. The SNMP AM performs an SNMP identifier to TeMIP Entity Spec translation using the following input parameters:

  - IP Address
  - IP Address and Trap Community
  - IP Address, Context Name and Context Engine Id
  - Owner field value

The IP Synonym service is a mandatory feature of the TeMIP V4.0 SNMP AM.

- The **OSI Synonym** service provides a solution for the ambiguities that may be present while translating OSI Distinguished Names into TeMIP Entity Specifications. Ambiguities are generated by complex GDMO models based on derivation and inheritance mechanisms. The OSI AM and OSI PM make use of the Synonym service for the OSI name translation. The OSI Synonym service is an optional feature of the TeMIP OSI Management Toolkit V4.0.

The **Name Service FM** Management Module allows the definition of relationships between TeMIP Entity Specifications and ASCII, IP or OSI synonyms. These relationships are stored in an Oracle database.

Available on the Compaq Tru64 UNIX Operating System, TeMIP Framework provides both generic and device-specific management functions, distributed management and language localization capabilities including:

- Motif® Graphical User Interface (GUI) and Command Line User Interface that provide consistent views and interactions with the management system, regardless of the objects managed or the protocols used to manage them. New and enhanced GUI features are present in this release of the product.
- Configuration Management functions that include automated discovery and device registration, topology mapping, and user-defined management domains.
- Distributed Notification and Alarm functions that enable users to define alarm rules and set up notification, and automated procedures to locate existing and potential network problems or events.
- Access Control and Logging of Operator Commands features. This allows the scope and the authorized operations to be defined easily for each kind of user. The Access Control features are available through a Security Toolkit that has a documented Application Programming Interface (API) that allows integration within your applications.
- Language Localization is provided through TeMIP Framework compliance with the XPG4 standard.

- Distribution is achieved by means of distributing Management Modules and services across multiple TeMIP systems (also called Directors) by making the Functions transparently operate across machine boundaries.
- A Director Management Application offers services, available from the Motif GUI, to manage the distributed TeMIP system (that is, Event Status monitoring, Director Topology display, Director Configuration Consistency checking).
- The TeMIP Name Service (TNS) is a network-wide service that makes distribution of TeMIP possible. TNS consists of client and server components (like DECdns). TNS stores information about entities in a highly accessible, distributed and replicated database, from where it can be accessed by any TeMIP director. TeMIP distributed system configuration data is stored in TNS. The TNS database contains the registered names created for TeMIP global entities, as well as names of child entities, reference data, Managing Director's name for each entity, and a list of the domains of which an entity is a member.

TeMIP Framework consists of a set of distributed layered Management Modules supported by an open API, an Executive or operating system-like set of module support functions, and an object-oriented Management Information Repository (MIR) providing data structure and storage functions.

Management Modules provide services to users and to one another. There are three types of Management Module:

- Function Modules (FMs) provide services such as object registration, statistics generation, fault detection, and notification to users and to one another.
- Access Modules (AMs) provide remote protocol support for, and management information about, different classes of managed objects.
- Presentation Modules (PMs) provide a consistent user interface for the direct manipulation of managed objects (through AMs) and user access to management operations (through FMs).

The Management Modules can be distributed on physically different (that is, remote) machines. This means that a Presentation Module installed and running on one machine can communicate with Function Modules on another machine, that can themselves communicate with Access Modules located on a third machine.

- The Executive provides system services that enable Management Modules to be installed and used independently or in combination.
- The Application Programming Interface defines how Management Modules call each other's services. The TeMIP Framework API is open and documented to support Compaq, third party, or user-developed modules.
- The Management Information Repository (MIR) provides a means to structure and store management information.

TeMIP Framework Function Modules

The TeMIP Framework includes generic and device-specific FMs that provide a variety of management services to end users and, in combination, to one another. These services include configuration management functions and fault management functions including alarm and notification services.

Generic FM services provide support for devices accessible through the TeMIP Framework AMs, other Compaq-developed AMs, or AMs developed and supported by third parties and users.

Configuration Management Functions

TeMIP Framework Configuration Management functions include both manual and automatic registration of managed objects, and support for user defined domains (groups of managed objects). These functions are provided by the following TeMIP Framework FMs and services:

The Registration FM is a generic FM that enables users to enter and manage data identifying each managed object in a network environment. Such information includes object instance data such as network names and addresses, and reference information such as device location, software revision levels, and contact names.

With the Registration FM, users have the option of selecting a local system-level repository, or setting up a distributed, network-wide, globally-available naming service - the TeMIP Name Service. With TNS, users and applications can assign names to resources (such as nodes, bridges, files, domain names, ...) and then use those resources without having to keep track of physical location or network address. The TNS option also enables multiple TeMIP Frameworks to share the same view of managed objects.

The Domain FM is a generic FM that enables users to assign managed objects to groups called domains. Domains are subsets of the managed object configuration, which provide user-defined groups that can be based on: equipment type (all switches, multiplexers, TCP/IP hosts, DECnet nodes, geography (all objects within a region, site, or subnet), personnel levels, or any other user-defined object group. Domains can contain or refer to other domains and can be hierarchical or overlapping. Individual managed objects can be contained within multiple domains. Each domain is associated with one Director.

Autoconfiguration services automatically locate, register, and map managed objects by class. Supported classes include TCP/IP hosts and DECnet

Phase IV nodes. Users can define domains for each class, and set network boundaries. The autoconfiguration functions can request network instance data from IP gateways and DECnet routers. As devices are located and management information gathered, the functions automatically map them in the appropriate user-defined domains and register management data in the MIR.

Note: The TCP/IP SNMP, DECnet Phase IV and DECnet-Plus AMs are included in TeMIP Framework.

The IP Reachability Poller FM sends notification to TeMIP Framework Notification Services when a specific IP node changes state (that is, it becomes reachable or unreachable). It provides TeMIP Framework with an efficient manner to determine if IP nodes are reachable or not.

Alarm and Notification Services

TeMIP Framework alarm and notification services are provided by a combination of Management Modules. These modules enable users to create alarm rules that can detect existing or potential network problems, and notification mechanisms for informing users when such problems occur or when network events take place. Alarms FM, Data Collector AM and SNMP AM modules support or generate ISO-formatted OSI events that can be handled by the TeMIP Fault Management applications (for example, IP reachability, incoming traps and enterprise-specific traps generated by the SNMP AM).

The Alarms FM provides facilities for users to write rule-based expressions (alarm rules) that use polled data or unsolicited event messages to trigger alarms. Alarm rules can be written for any managed object or entity class for which there is corresponding Access Module protocol support (Multiplexers, Cross-connect, OSI, SNMP, CORBA, DECnet Phase IV NICE, ...). The Alarms FM now benefits fully from the TeMIP filtering and correlation features, see the TeMIP Fault Management Software Product Description (SPD 45.24.xx).

Alarm rules can be based on state changes, simple arithmetic expressions, or occurrences (unsolicited event messages received through the appropriate Access Module). Alarm rules can be written for individual managed objects or wildcarding can be used to apply rules to all objects in a domain for a given object class. Alarm rules support the ISO alarm type and probable cause fields.

In addition to the standard TeMIP Framework notification functions described below, the Alarms FM allows for the execution of user-written command procedures. Such command procedures can be used to generate terminal broadcast or electronic mail messages, or automated procedures that a network manager or operator might implement when a particular alarm condition occurs.

Refer to the TeMIP Fault Management SPD 45.24.xx for a detailed description of the powerful alarms/events management user interface. In addition, the TeMIP Framework still provides a specific user interface by means of the Notification PM and other modules. The Notification FM and PM enable users to define the mechanisms used to alert operators when a particular network or system event has occurred. The functions recognize two types of events: configuration events, which are reported by a managed object or TeMIP Framework Module; and alarm events, which are generated by the Alarms FM whenever a rule fires or encounters an error (that is, an exception to the rule).

When an event occurs, the Motif/Iconic Map PM displays a color change on the appropriate object icon, and a message in the Notification window. Users can define the severity levels and select colors appropriate to the problem level. Notification also enables users to customize event collection and storage through its logging, filter, search, and view capabilities. Notifications (icon, line or text color changes) can be redirected from the object that generates the event to the object that is the subject of the event by means of the target directive.

The Event Collector AM (also known as the Data Collector AM) enables users to collect events from objects not directly managed by TeMIP Framework. Users can create customized icons for any object not directly managed by TeMIP Framework and include it in the Iconic Map.

TeMIP Framework Security

TeMIP Framework delivers the high level of security essential to all telecom or mixed data and voice distributed network operations. Its flexible and powerful Access Control mechanism allows the network manager to determine who accesses critical functions, physical or logical resources or objects down to the class/instance or directive level.

TeMIP Framework Security is provided through the use of:

- Access Control, which consists of defining restricted domains of activity (that is, what entity, verb, attribute or argument can be accessed) for each user.
- Logging of Operator Commands, which consists of tracking and storing Command Information generated by an operator during a TeMIP Framework session.
- The Security Development Toolkit allows developers to integrate the TeMIP Framework Security features into specific Presentation Modules or applications.

Access Control is a set of mechanisms that prevent a given user from accessing part of the management information when running a Presentation Module and is based on:

- Access Control (AC) Views that are filters (control rules) that determine which operations are allowed or disallowed.

- User Profiles that are the association between a user and a set of authorized functions as defined in AC Views.
- Access Control Management graphical user interface available (for authorized users only) as an Iconic Map launched application.

The Logging of Operator Commands (LOC) function stores pre-defined commands entered by a user into a database that can be examined later. It comprises the Central Command Logging function that applies to all concurrent PM sessions running on the TeMIP Framework system and the User Session Command logging function, providing the same logging and browsing features and allowing the operator to set up his or her own LOC environment before entering their personal PM session.

The Security Development Toolkit provides the AC and LOC Application Programming Interface and a shell application, allowing Presentation Module developers to obtain software library services (APIs) that perform Access Control against an active AC View as well as runtime Command Logging services.

TeMIP Framework Access Modules

TeMIP Framework AMs provide access to network and system objects in Digital Network products and other mixed, multivendor network environments that use the following management protocols: SNMP, CMIP, DECnet, NICE, DECnet/OSI and IEEE 802.2/Ethernet/MOP.

- The TCP/IP SNMP AM includes support for the following Internet Advisory Board (IAB) Simple Network Management Protocol (SNMP) RFCs: 1155, 1156, 1157, 1212, and 1213. This includes full MIB II support in addition to support for on-site enrolment of vendor-specific Enterprise MIBs including:
  - A MIB compiler that automatically checks the syntax of the ASN.1 Concise MIB definition (providing error messages to help identify syntax problems) and translates the data for loading the information into the TeMIP Framework Management Information Repository (MIR). The translation utility supports both SNMPv2 and SNMPv1 syntax and automatically generates on-line HELP.
  - An event-logging sink for collecting SNMP generic traps (unsolicited TCP/IP event messages): coldStart, warmStart, linkDown, linkUp, enterpriseSpecific, egpNeighborLoss, and authenticationFailure. Generation of ISO-formatted alarms (for example, IP reachability, incoming traps) and Vendor Specific Traps are also supported with this release of the product.
  - Ability to perform GET and SET operations on devices supported by SNMP agents.
  - ICMP ECHO_REQUEST (ping) support for verifying the reachability of an SNMP managed object at the IP level.
  - This release provides enhanced features such as SNMPv2C protocol support, raw SNMP trap data logging support, full support of the ASN.1 IMPORTS clause and a new MIB Translator Utility GUI.

Note:

Coexistence of SNMP tookit versions: In order to facilitate the migration of SNMP MIBs and applications, TeMIP 4.0 is delivered with two SNMP toolkits; the one included in the previous TeMIP Version (3.2), and the new SNMP toolkit, called "Internet SNMP Toolkit" throughout the TeMIP product documentation. Note that the delivery and support of these two versions of the SNMP toolkit will only be ensured in TeMIP 4.0. Only the new "Internet SNMP Toolkit" will be maintained after version 4.0.

Users of the legacy SNMP toolkit are therefore, expected to migrate their MIBs and applications to the "Internet SNMP Toolkit" during the lifetime of TeMIP 4.0.

- The DECnet-Plus AM provides access to DECnet devices that use the Compaq implementation of the standard Common Management Information Protocol (CMIP). This version of CMIP, implemented on DECnet-Plus devices, provides management operations and data gathering functions for DECnet-Plus networks, including the ability to sink DECnet events to the TeMIP Framework.
- The DECnet Phase IV AM enables users to manage DECnet Phase IV objects such as nodes, circuits, lines, and adjacencies. With the DECnet Phase IV AM, users can modify DECnet parameters, set characteristics, collect DECnet events, and poll for management data such as counters or status.
- The Circuit AM works as a client of management protocol modules to provide management of circuits connecting endpoints compliant with the Network Management Forum (NMF) definitions. Compliant endpoints include DECnet Phase IV and DECnet-Plus nodes, and TCP/IP hosts. Tying together circuit, line, link, and other end-point data, this AM can gather status data and store reference information about simple, point-to-point circuits or complex multi-channel circuits.
- The Script AM is a generic Access Module that executes a script (or command procedure) and propagates the output data back into TeMIP Framework as individual attributes. Once integrated, these attributes can take advantage of the alarm generation, notification, and recording facilities of TeMIP Framework.

The Script AM offers the following advantages:

- Allows integration of data into TeMIP Framework quickly and easily. No C code is required to write a script.
- Allows management of devices that only provide a command line interface.
- Allows integration of any data (as attributes) into TeMIP Framework, whether from a Structured Query Language (SQL) command, a system command or by running a script on a remote system.
- Allows integration of data from an executable, for which source code is not available.

- The Data Collector AM, also called the Event Collector, enables TeMIP Framework to collect events from objects not directly manageable by any other Access Module, or receive events that are not modeled within an already existing Access Module. Events are then made available to the rest of the TeMIP Framework and can benefit from its services, for example, for color changes on the Iconic Map or display in the Notification windows. To send events, the Data Collector AM provides both a programming interface and a command script interface allowing events to be sent from within programs or from command line or shell scripts. The Data Collector AM and the SNMP AM benefit fully from the TeMIP Filtering and Correlation features, that can be made available to any other Access Modules through the Filtering and Correlation Toolkit provided with TeMIP Fault Management. Refer to the SPD 45.24.xx for a more detailed description of TeMIP Filtering and Correlation capabilities.

Supported transport mechanisms include both UDP/IP and DECnet. Event parameters can include managed object class and name, severity, event name and event text. This interface is available for a variety of client systems including Tru64 UNIX, ULTRIX, VMS and DOS and provides a very simple method of sending events to the Framework.

Note: The source 'C' code is available for porting to other client environments as required.

The Alarm Generator AM generates OSI alarms or events on any entity in a distributed environment. It supports the Submit_Event directive on any entity class.

It uses a separate configuration file for each event type (partition, event id, and the list of mandatory arguments) that extends the Alarm Generator AM functionality to support new types of event, without modifying the code.

TeMIP Framework Presentation Modules

TeMIP Framework includes two Presentation Modules. The Motif Graphical User Interface (GUI) provides an Iconic Map interface with pull-down, pop-up command, application and directive accelerator icon bar, and monitoring windows that consistently present all managed objects and operations. Consistent access is also provided by the Framework Command Line PM (FCL PM). Multiple screen support allows dedicated TeMIP Fault Management Presentation Modules to be displayed on different screens.

The capabilities specific to the Motif GUI presentation style include:

- Map windows that display the contents of a managed environment (for example, a domain) using icons to represent managed objects and their subordinate or child objects, as well as status icons. Users can select icons representing managed objects (both entities and subentities) and initiate management operations from a map window. Several map windows can be displayed at one time, each displaying different views of domains of a managed environment. It is possible to define virtual domains (for display purposes only) that are independent of the collection activity (collection domains). The degree to which the domains for display and those for alarm collection purposes are decoupled, depends only on the way the domains have been configured on the director. It is therefore possible for these visual entities to benefit from the "sub-alarming" feature; new alarms on child entities produce a blinking, shaded area around the parent entity icon or object. The color of the shading shows the highest severity of the alarm(s).
- A Shelf View feature, which allows you to describe the contents of an entity (that is, its child entities) using standard Iconic Map drawings and graphical objects instead of the box-based only mode.
- Icons can be of XPM format or vector file, thus allowing free form icon definitions, or supporting shape masks. The backdrop images support XBM vector format (Framework format). Through XBM library provided converters, users can get other formats such as GIF for icon building. Automatic TeMIP application startup at Iconic Map PM startup, and application launch facilities are also provided.
- A Navigation box and ViewPort window that enable users to view an entire network configuration map at one time. With the ViewPort feature, users can navigate to, zoom in, and select a particular portion of the total network environment to display in detail in the Map window. A Top and Bottom navigation area for hierarchical or non hierarchical navigation in the domain tree is also provided.
- Management windows that enable users to select, perform, and view the results of management operations. As with map windows,

several different management windows can be displayed simultaneously.

- An integrated Toolbox window and other customization features that provide users with the ability to create, modify, or delete map icons, connecting lines, text, or other items in a map window. Users can create map icons, add Uniform Resource Locators (URLs) to icons in the map, add geographical maps or other backdrops, and add customized icons to the Toolbox for retrieval and re-use, as well as color customization of lines and texts.
- The TeMIP Framework Dictionary Browser lets you examine the management objects and their definitions stored in the TeMIP Framework dictionary. Using the Browser, the user can graphically view the types of entities that are configured for a TeMIP Framework.
- Other features such as:
  - Map layers, which display or hide groups of objects defined as a logical subview.
  - Map filters, which filter graphical objects (backdrop, entities with alarms, text or graphics).
  - Domain shortcuts, which provide navigational accelerators (links) between domains.
  - Graphical object tooltips, support of URLs on graphical objects, support of multi-line text objects...
  - A TeMIP to Web Browser interface, which provides online context sensitive help in HTML format.

The Framework Command Line PM provides character cell access to TeMIP Framework function and access capabilities. The interface supports only the Command Line mode.

Command line recall and editing, abbreviation, online help, symbol substitution, use of control key sequences, line continuation, and the type ahead function are all supported.

Command Line mode also supports the use of scripts to automate frequently used TeMIP Framework command sequences. Users can set up initialization files through the Command Line mode for establishing defaults and executing startup directives. In addition, users can log any command to an output file for storage and review or it can be used by maintenance operators in the field using a portable PC and a modem.

The Command Line mode provides online help.

TeMIP Framework Distribution

TeMIP Framework is by design distributed in the sense that it is implemented using the concept of Management Modules, which use a set of cooperative UNIX processes. TeMIP Framework distribution allows distribution of these processes across different management systems called directors. However, the aim of the distributed TeMIP Framework is to distribute the services (also called call requests) offered by the various Management Modules at:

- Access level (that is, Access Module) calls are distributed using **Entity Access Distribution**. The principle of Entity Access distribution is that each global entity might have an associated Managing Director to which the Call Access is dispatched.
- Function level (that is, Function Module) calls are distributed using **Domain Distribution**. The principle of Domain distribution is that each domain has an associated Managing Director to which the Call Function is dispatched, based on the value of the domain associated with the call request.

Each Director is itself an entity and, as such, is manageable using the TeMIP features. Each instance of a Director has a globally unique name.

A Distributed Director allows the forwarding and receipt of management requests to and from other Distributed Directors for any combination of specified Verb, Entity, Partition at the Call Request Interface. A Distributed TeMIP system consists of a Local Director and one or more Remote Directors. Three different types of Director can be distinguished:

- Server Director, allows forwarding or receipt of requests to and from other Distributed Directors. It can have either the TeMIP Framework Server license or the TeMIP Framework Access Module Server license.
- Client only Director, mainly runs Presentation Modules and requires the services of distributed directors as Servers. A Client only Director, cannot receive requests from other directors, it requires the TeMIP Remote Presentation Module (CLIENT) license.
- Non distributed Director, does not allow forwarding or receipt of requests to and from other directors, as it does not have any distribution rights.

Note: Only the FCL PM can be run on a TeMIP Framework Access Module Server system.

TeMIP Name Service

The distribution of TeMIP requires the use of the TeMIP Name Service.

TNS offers the following features:

- Unique network-wide names; all TeMIP users and applications in the network use the same name to access a managed entity.
- Use of the TCP/IP stack, instead of the DECnet-Plus communications protocol stack.
- Simplified management of network entity names that are stored and maintained by TNS,

eliminating the need to update and maintain a local Management Information Repository on each TeMIP director.

- Caches, or saves, information obtained from previous requests to look up a name. Caching maximizes overall performance and reduces network traffic.
- Security: access to TNS names can be assigned to individuals, or to Access Control groups.

It is possible to install the TNS server on a TeMIP V4.0 director system, or on a separate UNIX system.

With TNS, installation of the DECnet software is needed on a TeMIP V4.0 director only if the following TeMIP components (that make direct use of DECnet) are to be used:

- DNA4 (DECnet Phase IV
- DNA5 (DECnet-Plus)
- TeMIP OSI AM (use of DECnet is optional)
- Data Collector AM (use of DECnet is optional)

TeMIP Framework Extensibility

TeMIP Framework is an extensible management platform to which other TeMIP software modules, option packages, third party, or user-developed Management Modules can be added.

Third parties and users can develop software modules for the TeMIP Network Management Family of Products to provide access to and management functions for any manageable object. Software and documentation for the development of integrated TeMIP modules are available as part of TeMIP Framework and the Visual TeMIP Developer's Toolkit. For more information about Visual TeMIP, refer to SPD 60.64.xx. Refer also to the TeMIP Graphical ASCII Toolkit SPD 64.82.xx, the TeMIP OSI Management Toolkit SPD 51.28.xx and the TeMIP ESA SPD 70.40.xx.

TeMIP Framework includes tools that enable on-site enrolment of Management Modules. Documentation required for third party module enrolment must be supplied by the module developer.

The Presentation Module Toolkit is a set of tools and a library of routines that make possible the different ways of integrating Presentation Modules into the TeMIP Framework Iconic Map (for example, the launch mechanism, enrol operation, enroled application, expand field, application stand-alone PMs...). Refer to the Visual TeMIP SPD 60.64.xx for further details.

TeMIP SystemMate

TeMIP SystemMate is a client-server application providing a range of system administration capabilities through an integrated graphical user interface (GUI). The purpose of TeMIP SystemMate is to:

- Facilitate the installation and configuration of TeMIP Framework and associated products through **configuration entities**, substantially reducing the time needed to deploy TeMIP solutions.
- Allow the preparation of configuration entities to automate the installation and configuration of custom software configurations
- Provide TeMIP system administration functions with graphical displays.
- Provide Tru64 UNIX system administration functions with graphical displays.

TeMIP SystemMate is the nerve center for the administration of TeMIP solutions. It makes the transitions between the major stages in the life cycle of the TeMIP product easier, and provides a fully integrated, user-friendly environment for system administration.

Using TeMIP SystemMate, system administrators can:

- Deploy configuration entities to install, uninstall, configure, and migrate TeMIP products or custom configurations
- Export **bundles** of configuration entities to target systems and import bundles of configuration entities built on other systems
- Customize delivered **Template Systems** or build configuration entities from scratch, using insert, copy, and modification functions
- Administer and monitor TeMIP
- Administer and monitor Tru64 UNIX
- Monitor Applications defined within TeMIP — specifically the details of distribution, Domain hierarchies, access control, and process execution

TeMIP SystemMate V4.0 supports product installation, configuration, and related operations that offer a shell interface or an InstallShield interface. It thus addresses installation and configuration on the Windows NT operating system as well as Tru64 UNIX. The TeMIP SystemMate server must be installed on each machine targetted by automated installation and configuration.

TeMIP SystemMate Architecture

TeMIP SystemMate is based on a client-server model. It consists of a daemon server (known as the **SystemMate server**) which receives requests from clients (**SystemMate clients**). The SystemMate server can run standalone applications (shell scripts, executables, InstallShields). The communication protocol used between the client and the server is supplied with Java™; its name is JRMI (Java Remote Method Invocation).

The SystemMate server makes use of JVM (Java Virtual Machine) on Tru64 UNIX and Windows NT. It runs the requested standalone applications locally, on the server system. The simplest way to connect to a SystemMate server is to start a SystemMate client specifying the required server host name. According to your selections, the SystemMate client requests standalone applications and waits for the results. All data processing such as parsing and graphical display is handled by the client to minimize the server's load and to exploit the processing power of client workstations.

You can modify the target server dynamically during a client session. The Session menu provides a Session parameters menu item, which allows you to enter a host name or IP address. SystemMate validates the specified host name or IP address to ensure that it really exists and is reachable.

SystemMate Security

The SystemMate server offers the following security features:

- User authentication by means of login names with associated passwords, ensuring correct identification of the person at the client end of the connection.
- Access control, ensuring that authenticated users have access only to the information and operations they are authorized to use.
- Password encryption using the UNIX password algorithm, to protect data in transit from eavesdroppers.
- End-to-end data integrity checks, to ensure that information in transit has not been forged by a third party or corrupted by failures. This mechanism does not rely on the network services.

Note that SystemMate users are not the same as UNIX or Windows NT users. Each user has either Full Access or Restricted Access to SystemMate menu items. An initial master user is supplied with Full Access, and an initial guest user with Restricted Access.

Customized SystemMate Interface

Depending on the user's login name, the menus sent by the server to the client are different, so that user access to administration tasks is customized.

One of the SystemMate client's first requests to the SystemMate server during the connection phase is to retrieve the GUI menus. Each user login name has a token that defines the access level authorized. The SystemMate server thus sends the SystemMate client menus that contain only the menu items for which the user is authorized.

Installation Functions

The Installation menu offers menu items related to the installation phase of system administration activity.

- The Install Wizard menu item can carry out all the steps necessary to deploy software on several machines as defined in a configuration entity.
- The Build Config menu item provides access to the Configuration Builder, which allows the viewing, importing and exporting of any configuration entity, and the preparation of user-defined configuration entities (see below).
- The Subsets, Inventory menu item lists the subsets installed for a specified product.
- The Patches, Inventory menu item lists the patches installed. The Extraordinary patches, Install and Uninstall and Maintenance release patches, Install and Uninstall menu items allow you to install and uninstall different types of patch.

Configuration Entities, Directives, and Arguments

Configuration entities are hierarchical and have associated directives at all levels. From the top down the entity types and the levels they represent are as follows:

- **Configuration**: A complete software configuration comprising various Sites.
- **Site**: An operational center composed of one or more Systems.
- **System**: A logical system comprising one or more physical machines, on which one or more ComponentPackages will be installed.
- **ComponentPackage**: A combination of Components configured to provide a specific Network Management service or group of services (for example, TeMIP Fault Management, TeMIP Expert).
- **Component**: A single piece of software, usually in the form of a software kit, which is separately installable and configurable (for example, Network Time Protocol, TeMIP).

The directives associated with configuration entities divide the deployment of configuration entities into elementary tasks at each level. There is a very close relationship between the object model (the configuration entities) and the directives: each entity must have its own list of directives.

When you define a directive, you can specify arguments that govern the execution of the application or script called or are passed to the application or script for use during processing. Default argument values can be assigned at definition time, and then accepted or changed at deployment time. Argument values can be defined at

all levels for reusability purposes. A higher-level value overrides a lower-level value, if the lower-level value has been set as overridable.

A further feature of configuration entities is the facility to define variables. A variable can be used to assign the same value to several arguments or host names. Any variables defined are available to all configuration entities in the same bundle. Variables can have default values in the same way as arguments can.

Automatically generated documentation on a configuration entity is available on request through the Documentation menu in the Configuration Builder. This documentation is compiled from the description texts in the configuration entity.

The Install Wizard

The Install Wizard menu item allows you to deploy configuration entities, after defining any missing variable values, host names and argument values. It executes the selected directive for the selected entity.

An execution tree shows how deployment is progressing. You can control deployment by suspending at any point and resuming when you are ready.

If an error is encountered, deployment stops and you are offered the following choices:

- View the error log
- Retry the directive (after having solved the problem)
- Ignore the error and continue deployment
- Stop deployment

You can also choose to abandon deployment at any point by requesting SystemMate to stop at the end of the current directive.

Administration Functions

The Administration menu offers functions related to the post-installation phase of system administration activity.

For TeMIP administration, Start, Stop, Show, and Security functions are available. The Security function item calls the TeMIP Access Control GUI.

For TeMIP Name Service (TNS) administration, the Show function, and Server and Client Start and Stop functions are available.

For Tru64 UNIX administration, the following Tru64 UNIX functions are available:

- Account management
- Advanced File System (AdvFs) management
- Host management
- Kernel Tuner, to manage the attributes of the loadable kernel subsystem
- Logical Storage Manager (LSM)
- Process Tuner, to display the list of processes running, find a process, change process priority, or send a signal to a process
- System Information, to display the following status information: operating system and version, amount of RAM, number of CPUs, CPU activity, free memory, swap space, file system utilization, disk and tape device names
- Shutdown manager, to perform Halt, Reboot, Single-User mode shutdown, or Message-Only shutdown

Monitoring Functions (UNIX only)

The Monitoring submenus offer functions that display Audit/Reporting information, information on various TeMIP objects – namely directors, domains, entities, the dictionary, naming services, and management modules – and performance indicators.

The **Audit/Reporting** information available is:

- UNIX system statistics on memory, File Systems, and Network activity, obtained using the sys_check command
- Statistics on TeMIP software and datastores, obtained using the temip_sys_check command

For **Directors,** the information available is:

- Registered directors, showing the TeMIP directors involved in a distributed configuration.
- Inter-director connectivity, showing a matrix of connections between all possible pairs of directors.
- Managing Directors, showing lists of the global classes and instances managed by each director, or for a single Global class, the instances managed by each director.
- Applications and processes, showing status information.
- TeMIP director attributes for the remote server director.
- TeMIP environment variables set in the file */var/mcc/config/.temip_config* on the remote server. You can change environment variable names and values, add new variables, and delete existing variables.
- Event pool analysis, with statistics on all Getevent threads.

Domains

For **Domains,** the information available is:

- The domain hierarchy

Entities

For **Entities,** the information available is:

- Access control analysis by entity class, showing a list of the allowed and not allowed verbs controlling user access
- Find an entity name starting from a nickname
- Full entity information, showing the management module that handles requests for the specified entity class, and the domains the instance is a member of
- Navigation by entity full name, showing entities that refer to one another, for example, Circuits

Dictionary

- TeMIP Dictionary Browser (launched application)

Naming Services

- TNS browser (launched application)
- TNS monitoring, showing the directories, processes, semaphores, shared memory, and Clerk and Server attributes
- Synonym/entity name translation (bidirectional)

Management Modules

- Module information – classes managed and entities.

Performance Monitoring

- Times reflecting the performance of operations on Alarm Objects in real time or historically

Help System

SystemMate offers a complete **Help system** for all menus and menu items, displayed in HTML format in a Web browser.

Error Handling

All error messages are displayed in the SystemMate main window.

HARDWARE REQUIREMENTS

AlphaStation 600
AlphaServer 800, 1000A, 1200
Compaq AlphaServer DS10, DS20
AlphaServer 2000, 2100, 4000, 4100
Compaq AlphaServer ES40
AlphaServer 8200, 8400
Compaq AlphaServer GS60, GS140

Disk Space Requirements

For TeMIP:

Disk space required for installation:
/usr 115,000KB
/var 12KB

Disk space required for use (permanent):
/usr 0 KB
/var 500MB

For SystemMate:

Disk space required for installation of all components (STMBASE, STMCLIENT, STMSERVER, STMDOC):

100 MB on Tru64 UNIX
50 MB on Windows NT

Disk space required for use (permanent):

100 MB on Tru64 UNIX
50 MB on Windows NT

These counts refer to the disk space required on the system disk. The sizes are approximate; actual sizes may vary depending on the user's system environment, configuration, and software options.

Memory Requirements

For TeMIP:

The minimum memory supported is 96MB. However, the use of this software in conjunction with increased memory capability improves performance.

Note that more memory is required if you are operating in multi-user mode.

For SystemMate:

The minimum memory requirement is 30MB for the SystemMate Client and 40MB for the SystemMate Server.

Note that if more memory is made available for use with the TeMIP SystemMate software, performance will be improved.

Recommended Configuration

For running a TeMIP Framework system:

Compaq Tru64 UNIX V4.0F

- AlphaServer 1200 or 400
- 256MB memory, or more
- RZ28 disks or equivalent disk space
- Ethernet controller

For running TeMIP Client system:

- AlphaStation AU
- 96MB memory, or more
- RZ26 disk or equivalent disk space
- Ethernet controller

For running TeMIP Access Module Server system:

- AlphaServer 800
- 128MB memory
- RZ28 disk or equivalent disk space
- Ethernet controller

Note: Specific network environments may require larger configurations.

Optional Hardware

For multi-screen support, an extra graphical card (PMAGB-B) must be supplied.

SOFTWARE REQUIREMENTS

- Compaq Tru64 UNIX V4.0F
- DECwindows Motif

  Note: DECwindows Motif is compliant with OSF/Motif.
- CDE

OPTIONAL SOFTWARE

- Any other software modules or packages necessary for communication with the managed network elements.
- A TNS server kit on UNIX can be installed anywhere on the network to manage DECnet networks.

YEAR 2000 READY

This product is Year 2000 Ready.

"Year 2000 Ready" products are defined by Compaq as products capable of accurately processing, providing, and/or receiving date data from, into and between the twentieth and the twenty-first centuries, and the years 1999 and 2000, including leap year calculations, when used in accordance with the associated Compaq product documentation and provided that all hardware, firmware and software used in combination with such Compaq products properly exchange accurate date data with the Compaq products.

For additional information visit Compaq's Year 2000 Product Readiness web site located at http://www.compaq.com/year2000.

To ensure that this product is Year 2000 Ready, code assessment and system tests to verify the transition between December 31st 1999 and January 1st 2000 were utilized.

To ensure that this product interoperates properly with other hardware and software, the system tests involving Compaq's TeMIP V4.0 are applicable, as this product was verified as being Year 2000 Ready.

GROWTH CONSIDERATIONS

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

DISTRIBUTION MEDIA

This product is also available as part of the UNIX Consolidated Software distribution on CD-ROM. Please refer to the ordering information for each Software Media reference.

ORDERING INFORMATION

TeMIP Framework Server:

This includes all TeMIP Framework distributed Management Modules:

Software Licenses: QM-6HPAA-AA
(This replaces the licenses QL-4RCA*-AA and QM-4RCAA-A*)

Software Product Services:
QT-6HPA*-T* or QR-SP6HP-**

TeMIP Remote Presentation Modules:

This is the Client director license.

Software License: QM-6HRAA-AA
(This replaces the licenses QL-4REA*-AA and QM-4REAA-A*)

Software Product Services:
QT-6HRA*-T* or QR-SP6HR-**

TeMIP Access Module Server:

This includes all TeMIP Framework distributed Management Modules except the Iconic Map Presentation Module.

Software License: QM-6HQAA-AA
(This replaces the licenses QL-4RDA*-AA and QM-4RDAA-A*)

Software Product Services:
QT-6HQA*-T* or QR-SP6HQ-**

TeMIP Iconic Map Client for Tru64 UNIX:

Software License : QM-6GQ

Software Media and Documentation must be ordered using :

Software Media: QA-6HPAA-H8

Software Documentation: QA-6HPAA-GZ

Please note the QA-*****-H8 part numbers no longer include the QA-*****-GZ documentation kits. These must be ordered separately using the QA-*****- GZ number, if required.

Note: * Denotes variant fields. For additional information on available services, or hardware platform tiers, refer to the appropriate price book.

SOFTWARE LICENSING

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