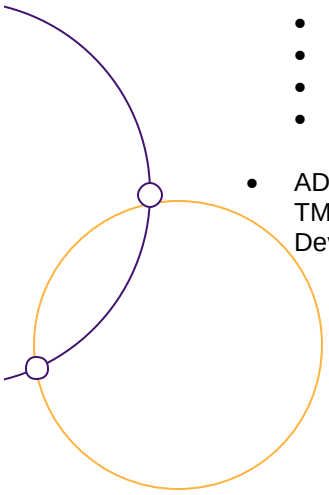
M*Ware TMN Agent Development Environment

The M*Ware TMN Agent Development Environment (TMN ADE) enables developers to easily build customizable, dynamically configurable, CMIP-conformant agents. The resulting, fully functional TMN Agent provides the value added, agent role process for network elements, Q-adapters, and mediation devices at the NE, EML, NML, and SML layers of the TMN model. .

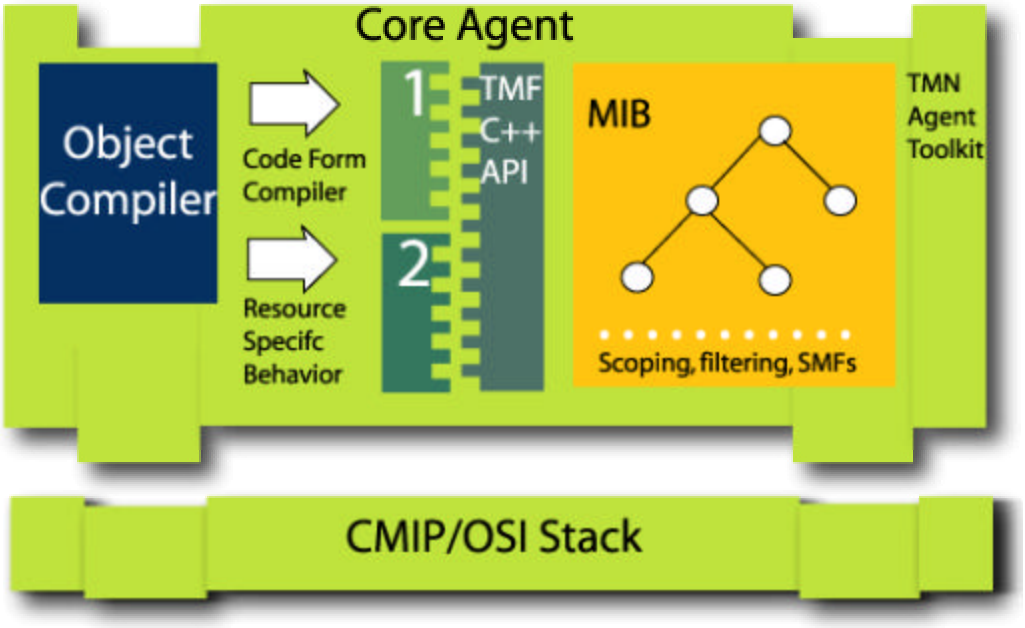
Highlights

- Vertel's ADE is part of our complete TMN development toolkit, which is the most professional, reliable and proven technology solution available in the Market.
- Vertel sold ADE (and other TMN parts like agent developer and simulators) to many major equipment vendors (including Alcatel, NTT, Nortel and Lucent) and incumbent operators (including AT&T, BT and Deutsche Telekom) all over the world.
- Vertel has all the knowledge related to TMN management in house, and available for customer projects and product support. In fact, many of the TMN standards were developed by committees that included Vertel experts.
- ADE provides an object-oriented development environment which is highly customizable to any specific TMN-Agent needs
- The M*Ware ADE provides ability to develop a prototype CMIP agent in minutes, based on any standards-conformant MIB
- Implements the TMF TMN/C++ High Level API (TMF API)
- ADE greatly reduces the application development time through integration with code-generation capability of the TMN Agent Simulator
- The TMN ADE automates most of the tasks associated with building an agent application, and leads the project team through each stage of agent application development--design, prototyping, development, testing, and deployment
- Dynamic MIB Loading features make it possible to develop generic Agent applications where the MIB is loaded at runtime without recompilation
- ADE offers standard support of Systems Management Functions (SMFs) for object state, event, and log management
- ADE building blocks include the fully compliant higher layers of the OSI protocol stack-- no third-party tools needed
- Uses ANSI C++ STL (standard template library) supported data types
- ADE is delivered as a binary product and supported on
    - Windows/NT 4.0 and Windows 2000
    - Sun Solaris 2.6 – 2.8
    - AIX 5.1
    - HPUX 11.x
    - If you use in a different platform please contact your Vertel account manager.
- ADE interoperates with any compliant CMIP manager, including the M*Ware TMN Simulator as well as managers developed with the M*Ware TMN Manager Development Environment (MDE).



Components

The M*Ware TMN ADE components are shown in the following diagram, and are described in the following sections.



Example Implementation

A core agent is depicted in Figure 1 above.
The standard TMN ADE product includes a memory based example implementation of a CMIP Agent which can be loaded within minutes. This Agent is fully capable of handling any CMIP operations and can be used as a template for the actual Agent.
Using M*Ware ADE, only the code shown in Box 2 (which defines the details of the specific resource to be managed by the developed agent) has to be generated manually by the developer. All the rest is provided by the Vertel TMN Agent Toolkit.
The code produced by the ASN.1/GDMO Object compiler and the code produced by the developer are integrated with the core agent functions, and the TMN agent is produced.
This way of working leads to very rapid development results.

M*Ware TMN Agent Toolkit

The TMN Agent Toolkit is provided in an easy-to-implement toolkit form. Its customizable C++ classes provide all the functionality of CMISE and ACSE, but hide the complexities behind an easy-to-use interface. You can implement all or part of the capabilities and functions, or you can customize the agent's capabilities so that it works with particular platforms or constraints.

The TMN Agent Toolkit's exposed interface is the TMF TMN/C++ high level API, referred to as the TMF API, which provides consistent interfaces for CMIS, GDMO, and ASN.1. Because the TMF API hides the implementation details, you can focus on applications. The TMF API's reusable C++ objects let you perform iterative testing--you can easily test

independent objects, so that you test only the changes to the MIB instead of the entire information base.

The Agent Development Toolkit includes features which makes it possible to choose between the static C++ API or choose to dynamically load the Information Model (MIB) at run-time. The MIB can be updated “on the fly” and the application does not have to be brought down and rebuilt. This substantially reduced the development testing cycle.

The dynamic loading further allows the developer to write the application in such a way, that the resulting applications do not need to be brought down either, once in operations. This is a key competitive advantage for network operators.

TMN Object Compiler

By using the TMN Object Compiler, you can skip the tedious and error-prone task of writing code for managed object classes. The TMN Object Compiler generates the C++ interface to your GDMO and ASN.1 MIB specifications. This generated C++ interface conforms to the TMF API.
The TMN Object Compiler also performs syntax and semantics checks on your input files.

Besides C++ code, the TMN Object Compiler can generate an HTML version of the MIB, based on your input file(s). This HTML-formatted MIB can then be viewed by any HTML-compatible browser.

The TMN Object Compiler compiles GDMO and ASN.1 notation from one or more input files. You do not need separate compilers and you do not need to link separate compiler output forms. You can use the files in their standard form, or you can customize input by using non-intrusive directives.

TMN CMISE OSI Protocol Stack

The TMN CMISE conforms to the TMF API's CMISE implementation, with full common management information services (CMIS), as well as all application layer services and OSI upper layers. The OSI upper layers provide support for ROSE, ACSE, PRESENTATION and SESSION.

TMN CMISE is manager/agent role-independent, and its interface is platform-independent to ease portability. TMN CMISE also includes interfaces to all available transport products. Vertel has compatible products to support all seven layers of the OSI reference model, as well as TCP/IP. (See the TMN UTS section and datasheet.)

TMN SMF

Vertel's TMN SMF is a set of libraries and modules that transparently enable Systems Management Functions. You do not need additional application code to implement the TMN SMF. The TMN SMF is dependent on, and implemented behind the TMF API.

The TMN ADE SMF components support event and log forwarding, filtering, and storage, as well as association handling. (Complying with the in ITU X.730, X.731, X.732, X.733, X.734, X.735, and X.736 defined Systems Management Functions.)

Standards Conformance

- ITU X.200: Reference Model for OSI
- ITU X.209: Specification of BER for ASN.1
- ITU X.213: Network Layer Addressing
- ITU X.701: Systems Management Overview
- ITU X.710: CMISE Definition
- ITU X.711: CMIP Specification
- ITU X.720: Management Information Model
- ITU X.721: Definition of Management Information
- ITU X.722: Guidelines for Definition of Managed Objects
- ITU X.730, X.731, X.732, X.733, X.734, X.735, and X.736: Systems Management Functions
- ITU Q.822: Stages 1, 2, and 3 Description of Q3
- TMF: OmniPoint 2.0
- TMF: TMN C++ High Level API

Vertel M*Ware is a complete product line of pre-built and customizable components and solutions for easy network management development and integration. M*Ware's distributed, model driven architecture ensures that Management systems (Managers/Agents) as well as integration with networks and other OSSs are efficient, maintainable and highly re-usable.

About Vertel

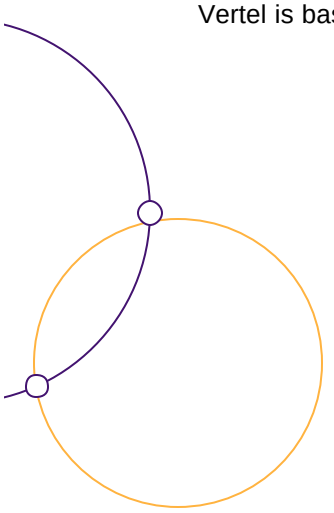
Vertel is a leading provider of convergent service management mediation solutions.

Since 1995, Vertel has provided network management, mediation and integration solutions to both telecom infrastructure vendors and service providers such as Alcatel, Nokia, Motorola, Lucent, Nortel, NTT, Samsung, AT&T, BT, Deutsche Telekom, Cingular and Williams Communications.

Vertel's in-depth knowledge and commitment to industry standards, combined with experience of working with many different equipment types, creates high performance solutions that enable customers to quickly cross technological barriers. Vertel's mission is to make its customers successful by enabling them to reduce operational costs and introduce new services, networks and OSSs while leveraging existing investments.

Vertel's core product offering, M*Ware, allows seamless management in multi-technology and multi-vendor environments. M*Ware offers a full suite of mediation based applications that can address protocol translation, data transformation, element and network management, OSS application integration, and OSS exchange services. M*Ware components are highly scalable and are very suited for mission critical operational environments. Vertel's Professional Services organization develops customized communications software solutions tailored to individual customer requirements, and also offers project management, systems analysis and other technical services.

Vertel is based in Woodland Hills, California and has sales offices throughout the world.



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Related M*Ware Products

The following products are also available from Vertel, and compliment the M*Ware TMN Agent Development Environment:

M*Ware TMN Agent Simulator

Use the TMN Agent Simulator

- To test your manager applications during every phase of application development
- as a script-driven *agent*, so that you can compare the behavior with your own agent application's behavior.

The TMN Agent Simulator can generate the necessary specific C++ application code for your Agent development. This code can be used directly within the Agent Development Framework.

M*Ware TMN Manager Simulator

Use the TMN Manager Simulator in order to test your TMN ADE-developed agent application during every phase of application development. .

Both the TMN Agent and Manager TMN Simulator use TCL scripts to emulate the behavior of a fully-implemented Q3-conformant management entity.
TCL scripts are platform-independent and allow scripts to be re-used across implementations. The TMN Simulator's test scripts can be executed interactively or in batch mode. The built-in TCL interpreter evaluates all scripts and executes specific behaviors.

M*Ware TMN Manager Development Environment

The Vertel TMN Manager Development Environment (TMN MDE) is one of Vertel's most popular products, it is of course fully compatible (and recommended) for use with the TMN ADE.
Like the TMN ADE, the TMN Manager Development Environment's user interface conforms to the TMF API. The TMF API provides a consistent interface for developing both manager and agent applications, thus promoting reusability across application development projects and reducing training costs and learning curves. Read our M*Ware MDE datasheet for more details.

M*Ware TMN-UTS

M*Ware Unix/NT telecommunication solutions (UTS) provide standards-conformant open systems interconnection (OSI) transport products that includes data transmission services (the lower layers) for any OSI-conformant application such as CMIP applications, and File Transport, Access, and Management (FTAM). UTS-NetLink contains UTS-TCP (RFC-1006), UTS-WAN (X.25) and UTS-LAN (CLNP) protocol stacks and are supported on Solaris, HP-UX, Windows NT and Windows 2000, and AIX.

M*Ware Convergent Manager and Agent Development

M*Ware also offers a manager and agent development environment for many different protocols, including TMN CMIP, but also SNMP, CORBA, TL-1, ASCII, XML, etc. Please read the dedicated datasheets about these products, that include many of the specific TMN features explained here, but can contain adapters and support libraries for other protocols as well. This ideal environment enables you to build equipment and networks for the multi-technology, multi-protocol services requested today!

21300 Victory Boulevard, Suite 700
Woodland Hills, CA 91367
Tel: (818) 227-1400 · Fax: (818) 598-0047
www.vertel.com