



**web-based  
enterprise  
management/  
common interface  
model (WBEM/CIM)**



**backgrounder**

## executive summary

The growth of e-services has created a need for more information sharing and interoperability between management applications to optimize service delivery. This means more monitoring of systems and network performance to add or subtract capacity for meeting business objectives. This increased need for manageability is fueling the need for new industry standards to increase management interoperability.

HP, Microsoft®, Sun, IBM, Intel®, and other IT industry leaders have united behind the Distributed Management Task Force (DMTF) to create manageability standards. The DMTF's Web-Based Enterprise Management/Common Information Model (WBEM/CIM) was first released in 1998 and has evolved to address various data, messaging, and directory issues affecting interoperability among management applications. WBEM is an umbrella term for using Internet technologies to manage systems and networks. Formats that access this information include HTML and XML. CIM is the schema of information about computer systems and network devices. It includes schemas about systems, networks, applications, and devices. New schemas are continually being developed. CIM data also provides a mapping technique for the interchange of CIM data with Management Information Base (MIB) data from Simple Network Management Protocol (SNMP) agents and Management Information File (MIF) data from Desktop Management Interface (DMI)-compliant systems.

Management applications are becoming a competitive battleground and vendors are aggressively introducing enhanced functionality. Most vendors are initially implementing the WBEM/CIM standards to provide a common integration framework for a family of management applications. Some level of multivendor integration is now possible and this will grow as WBEM/CIM standards continue to evolve. The WBEM initiative is another example of HP's commitment to drive and support standards.

## situation analysis

### systems, network, and application manageability today

Manageability today has evolved into a strategic capability necessary to choreograph the efficient delivery of end-to-end e-services. Enterprises and service providers are seeking to scale e-services up or down to deliver global capacity-on-demand across all information infrastructures.

Providing secure capacity-on-demand across networks, systems, storage, and applications is a complex task. It requires sophisticated functionality to monitor infrastructure and make capacity decisions.

Most management solutions marketed today are one of three types: single event management products, frameworks, or a family of integrated management products. Single event management products include, for example, system administration tools, a network manager, or an automated storage management product. Alternatively, many vendors offer a framework into which point solutions can be integrated with extra cost and effort. The trend is pointing towards the creation of a family of preintegrated management products into one framework, delivering more functionality with less customer effort.

Management vendors provide some level of unified information and application integration in their family of integrated products. However, most integrated management interoperability relies on proprietary architectures that are designed to work best with vendor-specific products. This usually limits functionality to only those elements supported by the vendor.

Increased standardization for easier integration and portability of management applications is a MUST in today's highly demanding always-on internet infrastructures.

## e-services manageability requirements

One of the biggest challenges facing enterprises and e-service providers is to monitor infrastructures in order to identify or predict bottlenecks and unused capacity areas before they occur. Then they must rapidly add or subtract capacity to meet service level commitments (SLAs), or to avoid paying for unused capacity. Additionally, management systems should link to internal and external accounting systems while providing usage information to accurately bill and plan capacities for future operations. This will open up the possibility of initiating fast new IT services to improve your time-to-market for a product or service in order to achieve faster revenue generation.

Managing the infrastructure necessary to add and subtract information resources to meet capacity-on-demand or an always-on internet infrastructure requires unified access to all management data. Throughput across the information infrastructure is governed by the slowest elements. Constraints must be identified and scaled to manage the smooth flow of services necessary for meeting service levels.

Unified management information must be accessible upstream and downstream within the information infrastructure and made available to an integrated set of applications spanning all critical information resources.

## the history of the DMTF and WBEM/CIM

The DMTF began life as the Desktop Management Task Force, with the visionary charter to ease management of client devices. The first DMTF standard, the Desktop Management Interface (DMI), was published in 1993, before the torrid commercial growth of the Internet. DMI was targeted at remote management of local area network (LAN) clients. In contrast, SNMP, another well known industry standard, focuses mostly on server management across networks.

The DMI standard was well received but the limitations of narrowly focusing on managing LAN desktop clients were obvious. The more ambitious Common Information Model (CIM) initiative was launched in September, 1996. The initial CIM industry partners were HP, Compaq, Computer Associates, Intel, Novell, Microsoft, Sun, and Tivoli/IBM.

The DMTF became the Distributed Management Task Force in May, 1999, recognizing the broader need for management standards. During the previous year, the DMTF standardization process had been recognized with the award of standardization charters for Directory Enabled Networks (DEN) as well as the industry Web-Based Enterprise Management (WBEM) initiative.

DEN was added as a second DMTF Core Model in 1998, with approximately 70 of the DMTF's 200 members focused on advancing directory and repository management standards. Most of the LDAP standards contained in WBEM/CIM Core Model version 2.5 came from the DEN initiative. The WBEM initiative was folded into the WBEM/CIM process and model as an umbrella term applying to all Internet management standardizations.

The first CIM Core Model specification was released for peer review in December, 1997. This became the first Core Model schema, the Application Management Model, in May, 1998. New versions of the Core Model are released approximately every six months. Previous versions have addressed schema support to integrate management of XML, HTTP, storage area networking, and trouble ticketing.

WBEM/CIM allows different management applications to collect data from a variety of sources in a standardized fashion. The WBEM/CIM specification address three areas of standardization, covering issues ranging from universal to vendor specific areas (Figure 1).

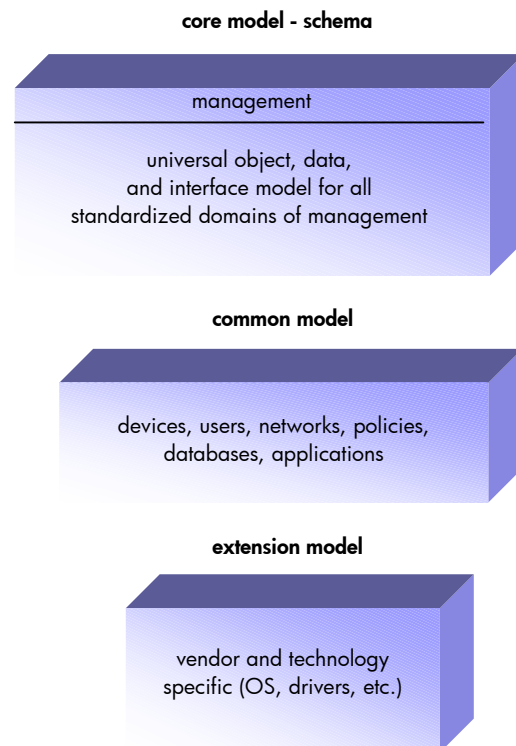


figure 1. WBEM/CIM - three areas of standardization

The first WBEM/CIM level is the universal WBEM/CIM Core Model, commonly referred to as the schema. It is the universal object, data, and interface model for all standardized domains of management. Every vendor's management systems must interface with the WBEM/CIM Core Model, which greatly simplifies management interoperability. The WBEM/CIM Core Model version 2.5 was released on February 15, 2001. This version added standard and native Lightweight Directory Access Protocol (LDAP) directories to the schema object and interface definitions for IPsec security. With IPsec support in WBEM/CIM 2.5, vendors have a common set of objects and interfaces for managing virtual private network (VPN) clients and public key exchanges to establish VPN sessions. LDAP directory mapping in WBEM/CIM 2.5 supports sharing data among the many management applications that rely on LDAP, such as service provisioning, user profiles, and access control.

The other two levels of the WBEM/CIM specification build on the universal Core Model to bring more integration and interoperability to lower level management applications and functions.

The second of the three WBEM/CIM layers is the Common Model, which addresses specific independent management domains beneath the WBEM/CIM Core Model. The Common Model typically address lower level implementation details such as devices, users, networks, policies, databases, or applications. Only those vendors delivering capabilities in the specific independent management domains need to implement the necessary WBEM/CIM Common Model object interfaces.

The lowest level of WBEM/CIM standardization is the WBEM/CIM Extension Model, a vendor and technology specific extension of the common model. It is unique to vendors and individual environments, such as operating systems or drivers.

SNMP is an existing management messaging standard used by most server platforms and management applications today. SNMP will not be replaced by WBEM/CIM—it will be a provider to WBEM/CIM, as well as DMI. WMI—the Windows® Management Interface—is the Microsoft implementation of WBEM/CIM and is integrated in the Windows platforms.

## hp and WBEM/CIM

HP has a long history of driving industry standards and was one of the first vendors committed to “open systems”. HP is a founder of the WBEM/CIM initiative and has chaired several WBEM/CIM working groups in the DMTF. WBEM/CIM is a strategic industry standard that HP is using to integrate our industry leading manageability products. Portions of the WBEM/CIM standard are used now for HP Tootools and OpenView for Windows. WBEM/CIM will provide an industry

standard to grow the manageability marketplace with cost-effective, integrated, and efficient products. A growing market for management solutions for systems, network, security, and other information resources will provide increased solutions for HP customers.

HP is extending the support of WBEM/CIM to the PA-RISC/HP-UX and Itanium/HP-UX platforms, as well as the HP OpenView product suite. Management of Windows- and HP-UX-based HP systems will be unified with WBEM/CIM support added to HP Tootools and Servicecontrol Manager (SCM), which will ultimately result in one unified Tootools and SCM architecture. In addition, HP is working with the Linux community to ensure a robust WBEM/CIM implementation for Linux, to give a high degree of unified manageability between HP's platform management applications running HP-UX, Windows, and Linux.

HP OpenView will use WBEM/CIM as a source of management information. With a good set of HP-UX data providers, OpenView can provide excellent management of HP-UX and instrumented applications. In addition, OpenView proposes to manage WBEM/CIM itself using a Smart Plug-in to monitor the health of critical WBEM/CIM infrastructure components such as the WBEM/CIM Object Manager. These initiatives position HP as a unified network, system, and security management vendor, with an end-to-end and top-to-bottom manageability architecture capable of addressing capacity-on-demand and always-on internet infrastructure requirements.

## benefits

HP customers will benefit from WBEM/CIM and other standards initiatives that HP is involved in. Benefits include purchasing products that will have a higher degree of interoperability and easier portability of management applications. Costs to integrate multivendor solutions will be lowered. The ability to easily and rapidly deploy 3<sup>rd</sup> party software and hardware components will be achievable. WBEM/CIM provides specific benefits in reducing the cost and complexity of enterprise management. This will ultimately lower a customer's cost of owning and operating homogeneous and heterogeneous IT environments.

## summary

The growth in e-services is driving the marketplace for manageability products to support capacity-on-demand and always-on internet infrastructure needs. These needs require a unified view of management information with an end-to-end and top-to-bottom integration of management applications.

The DMTF's WBEM/CIM standard is a strategic industry initiative and has been evolving since 1997. It defines three levels of functionality. The top level, the Core Model, defines object, data, and interface standards for all vendor's manageability products. The lower two levels, the Common Model and the Extension Model, are more vendor-specific.

HP is committed to driving standards and will use WBEM/CIM to provide unified management data and interoperability for HP's PA-RISC, IA-32, and Itanium platforms, while adding support for HP OpenView. WBEM/CIM will provide a path for HP customers to leverage their manageability environments to lower IT costs and support their business to bring products and services to market faster than they can today.

## definitions

**DEN** – Directory Enabled Networks, central depository of information about users, applications, and network resources. Turned over to DMTF in 1998.

**DMI** – Desktop Management Interface, management system for PCs developed by the DMTF. Founded in 1992 to develop, support, and maintain management standards.

**DMTF** – Distributed Management Task Force, industry consortium founded in 1992 to develop, support, and maintain management standards.

**HTML** – Hyper Text Markup Language, the language used for Internet Web pages.

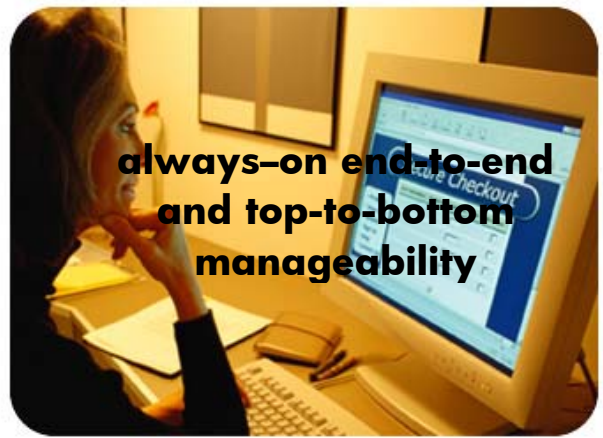
**HTTP** – Hyper Text Transport Protocol, the standard Internet protocol to transmit and receive Web page information.

**IA-32** – 32-bit Intel architecture processor.

**Itanium Processor Family** – Intel's family of processors based on the Itanium architecture.

**Itanium Architecture** – the 64-bit Intel processor architecture co-developed with HP (previously known as IA-64).

**LDAP** – Lightweight Directory Access Protocol, standard used for different directory services to send and receive information.



**MIB** – Management Information Base, SNMP structure that describes a monitored device.

**MIF** – Management Information File; DMI file format for PC hardware and software.

**PA-RISC** – Precision Architecture; HP's implementation of RISC-based CPU architecture (64-bit processor).

**Schema** – definition and mapping of management elements used in WBEM/CIM.

**SNMP** – Simple Network Management Protocol, widely used network monitoring and control protocol. A MIB passes device information to agents that pass information to SNMP to be carried to the management application.

**WBEM/CIM** – Web-Based Enterprise Management/Common Information Model, umbrella term for using Internet technologies to manage systems and networks.

**WMI** – Windows Management Interface, Microsoft's WBEM/CIM implementation for Windows-based platforms.

**XML** – Extensible Markup Language, the application development language used to create Internet schemas for dissimilar applications and devices to exchange information.

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