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## **Simplifying Device Management: An Update on the TM Forum's Initiative**

by Chris Ballard

As the new digital media commerce and service applications chains emerge, there is an explosion of isolated solutions. There are lots of new devices in the value chain and many more are coming. The devices are of many different types and employ a variety of methods to connect to each other and to applications to deliver the services needed by their users. There are also multiple protocols that have evolved to manage the devices. Enterprise customers, service providers, consumers, network infrastructure providers, retailers and resellers, and device manufacturers all have a stake in simplifying the management of large numbers of existing and newly arriving devices. Key innovations from device players (such as the Apple iPhone store, Google's Android, Nokia's Sybian outsourcing, and the war for the home gateway market by gaming companies) place welcome but difficult demands on the business.



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Consumers lose time and become frustrated trying to use and connect a quickly increasing number of new devices at home and on the move. They also encounter an upward spiraling of unexpected charges when using and connecting the devices.

Device manufacturers experience cost increases and squeezed margins due to product returns and user support costs. Their brand credibility can be damaged due to gaps in customer support that lead to consumer dissatisfaction.

Service providers find that their customers expect exponentially increasing bandwidth, but there is little elasticity on the price they are willing to pay. Further, the costs to deliver customer care are difficult to contain due to lack of user support in the device offerings.

Enterprise customers need to deploy their IT staff to fill the gaps in device management, increasing their total cost of ownership.

The price of inaction by the industry to master device management will be high! For consumers, "time and money fatigue" will result in loss of enthusiasm to buy newer devices, resulting over time in relative dampening on the appearance of new and interesting devices and applications. For device manufacturers, plummeting sales will result in industry consolidation and loss of resources to innovate. The costs of user support and the losses due to returns will be unacceptable. For service providers, there will be a loss of new revenue opportunities as well as existing revenues and an unending proliferation of staff associated with managing devices. For enterprise customers, there will be a loss of agility due to lockdown of highly skilled staff on work not associated with core business needs.



Leading members of TM Forum have started to collaborate to define areas not yet fully addressed by the device management solutions and standards currently available, across a variety of devices and connection technologies. These members include: T-Mobile Netherlands, Korea Telecom, Telecom Italia, Ericsson, Nokia-Siemens Networks, Siemens, Telcordia, Cisco, HP, Square Hoop and Peak8 Solutions. Agreeing on the requirements that need to be addressed will lead to further work to specify standards, either within TM Forum, or in other relevant partner industry organizations that will be identified and recommended as best suited for a particular requirement.

Deliverables planned by the TM Forum include a common roadmap for digital

commerce enablers -- encompassing device management, the content encounter vehicle, and new programs to address value chains and end-to-end customer experience management. A key aspect of this will be a *device management framework* – an architecture to describe how a device integrates into an overall end-to-end managed service delivery, with a base set of requirements that must include aspects such as location, presence, on/off status, screen aspect ratio, network types supported (e.g. 3G, GPRS), and advanced security features.

Envisioned device management collaboration projects in the TM Forum also include:

- Automated and enhanced device user support to lower costs and improve margins for device manufacturers, as well as to increase customer satisfaction and ensure brand loyalty
- Device and service provider procurement guidelines for enterprise buyers
- Management interfaces on devices to support QoS offerings, taking into account the impact to home networking device manufacturers

The concept of the TV, DVD player and the gaming console becoming a retail platform for the media industry is the classic over-the-top service. Telcos and MSOs can do very little to combat this – apart from applying gigabyte restrictions on the download capacity of broadband lines, which they will certainly do. But a far smarter move is to bundle a service broadband offering with the sale of every *connected* DVD, TV, or game console, with guaranteed quality of service (QoS).

- Enabling real time detection of the current device type being used by the end-user, as well as the real-time status of devices

There is usually no way (common or otherwise) to know the current status of devices (e.g. on or off). Device detection must be a multi-vendor-capable solution, collecting triggers and interacting with network elements independent of the different network element suppliers' equipment installed in the service provider's network.

Device detection/status has several main aspects:

oDevice detection enables the service provider to detect new devices connecting to the network and also to trigger relevant actions in different network elements such as the device management server or the provisioning server.

oDevice detection can also provide information when a new user starts to use the device. In this way the service provider is able to provision user-specific service parameters and/or initiate other relevant management of the device by using a device management server and triggering the provisioning server to do the same on the network. One example of this is in mobile networks when the phone is transferred to a new user and the new user has different subscriptions than the previous one.

oDevice detection/status can also mean actively scanning the network to identify

new devices. The end user may add new devices to the home network, without the service provider noticing it. Those devices may also be managed by the service provider based on a subscriber request.

oDevice detection can also be extended to error detection. When a device is not able to connect to a network element, the error can be automatically detected in the network element. Depending on the nature of the error (no subscription, wrong parameters, and so forth) the relevant correction can be triggered. For example, the connection parameters can be updated in the device.

oDevice detection must be a multi-vendor-capable solution. It collects triggers and interacts with network elements independent of the different network element suppliers' equipment installed in the service provider's network.

- A database of devices that describes the device capabilities in detail – in order to know how the devices are being used

Earlier devices typically had one service. With increased convergence, devices have started supporting multiple services and are expected to support even more services in the future. For such a scenario, instead of building service-specific silos, as is often the case now, a horizontal and abstract way to represent device capabilities will be needed, leading to the need for a device capabilities database. This information base identifies the devices and maps them to various device attributes. The database needs to include relevant device information (such as brand and model), capabilities (such as features supported), and configuration information (e.g., how to configure the device for certain services). The list of other device attributes could be made optional to take account of certain device-specific details.

It must be possible to edit the device database and add additional devices and device attributes. This will help to resolve unknown device or device attribute issues. Also, it must be possible to remotely update the device database on a regular basis including incremental and full updates. Export and import facilities must be provided by the device capabilities database.

- A common approach to detect faults in the devices, thus enhancing their usability, including user-initiated or auto-run diagnostics, and user control for remote diagnostics

We may distinguish the following scenarios:

- Hardware and software faults of end-user devices: Diagnostics might involve both self-detection mechanisms on the device and active monitoring from the network side (the latter is the only option for an important category of problems like power-off of device and total loss of connection).
- Device/service configuration: Configuration checks might be initiated locally (auto-run or by the end-user) or

remotely.

- Service performance and quality issues (detected through suitable KPI measurements on device): The corresponding measurements might be performed proactively (permanent or selected time intervals; all or selected devices) or reactively on request.

Issues to consider relating to diagnostics:

- What is the work flow for the diagnostics scenario and who is involved (and what's the impact on OPEX)? For example:
  - Completely autonomous (auto-run) diagnostics, no human-in-the-loop
  - End-user initiates local diagnosis
  - End-user initiates remote diagnosis through corresponding self-test portal
  - End-user initiates remote diagnosis through call to service desk (should be minimized!)
  - Network operator/service provider initiates remote diagnosis (end user not involved)
- Depending on the involved roles, what information is presented to which stake holder, and how is it ensured that the corresponding information flow is consistent? For example, what diagnostics information is relevant for:
  - End-users
  - Call center/service desk agents
  - Network operation centers
  - Service providers
  - Device manufacturers
- How far can existing standards (e.g. those of the DSL Forum or OMA-DM) be used to cover the use cases described above - where are the gaps?
- Scalability issues: A full (proactive) monitoring solution that covers all aspects described here, implemented in a brute force manner, won't work for millions of devices. What happens in the case of service quality degradation due to a problem in the core network that is also detected on each device?
  - A standard industry approach to identify different kinds of devices
  - Implementation guidelines for the device management framework, to enable remote device management on the devices
  - Automatic provisioning of devices without manual intervention, without any

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need for software configuration programs or jumpers, to make the device initially ready for service (Automatic provisioning implies device detection, device authentication, user-device mapping, firmware upgrade, software update and auto configuration, which is based on policy.)

- A common way to transmit management operation requests to the devices behind the network address translation (NAT) boxes, that are proliferating
- Gathering operational information in a consistent manner for device life-cycle management -- planning, procurement, deployment, and disposition
- A standard structure and method to gather user preference data for service management, such as channel preference and service/content usage preference
- Usability metrics

User experience of the device matters the most and is of extreme importance for end-to-end service quality and experience.

The TM Forum is well positioned to address these challenges. A critical mass of stakeholders is already engaged to address the end-end aspects across the entire value chain. The Forum's service provider and enterprise focus enable correct business requirements to be known and prioritized for managing devices. The Forum has a successful track record and infrastructure in place to manage collaboration programs. Faster delivery of solutions and better integration is possible due to expertise and resources in related business operations frameworks (for business processes, information, and applications) as well as product lifecycle management and service delivery.

The collaboration team is developing a guidebook on end-user device management and a companion industry groups positioning document.

Other industry groups that the TM Forum plans to work with are shown in Figure 1. The intent is not to re-invent, but rather to build upon and leverage related work wherever possible. This list is growing as the collaboration team expands to include new companies and work progresses.

**Groups that produce technical specifications:**

The Broadband Forum ([www.broadband-forum.org](http://www.broadband-forum.org))  
Open Mobile Alliance (OMA - [www.openmobilealliance.org](http://www.openmobilealliance.org))  
CableLabs® ([www.cablelabs.com](http://www.cablelabs.com))  
Consumer Electronics Association (CEA - [www.ce.org](http://www.ce.org))  
Universal Plug and Play (UPnP™) Forum ([www.upnp.org](http://www.upnp.org))  
IETF Netconf WG (<http://www.ietf.org/html.charters/netconf-charter.html>)  
The DVB Project ([www.dvb.org](http://www.dvb.org))  
OSGi Alliance ([www.osgi.org](http://www.osgi.org))



## Groups that produce requirements:

TM Forum ([www.tmforum.org](http://www.tmforum.org))

DMTF – PCs are a major category of end-user device ([www.dmtf.org](http://www.dmtf.org))

ITU-T ([www.itu.int/ITU-T](http://www.itu.int/ITU-T))

Metro Ethernet Forum ([www.metroethernetforum.org](http://www.metroethernetforum.org))

Device Management Forum ([www.devicemanagement.org](http://www.devicemanagement.org))

WiMAX Forum ([www.wimaxforum.org](http://www.wimaxforum.org)) Service Provider Working Group (SPWG)

Home Gateway Initiative (HGI - [www.homegatewayinitiative.org](http://www.homegatewayinitiative.org))

Open Mobile Terminal Platform (OMTP - [www.omtp.org](http://www.omtp.org))

Digital Living Network Alliance (DLNA - [www.dlna.org/en/industry/home](http://www.dlna.org/en/industry/home))

Open IPTV Forum ([www.openiptvforum.org](http://www.openiptvforum.org))

IPTV Interoperability Forum ([www.atis.org/IIF](http://www.atis.org/IIF))

Figure 1. Industry Groups Related to Device Management

For device manufacturers and consumers, education may be needed to overcome resistance to paying for management support in devices. Device manufacturers are not a monolithic group – concise subgroup identifications and targeted value propositions are needed. A highly competitive device market may create resistance to collaboration.

For service providers, it will be critical to fund participation to develop and deploy the device management framework and the key projects. For enterprises, a key element will be recruiting other enterprises to come join the effort to create common procurement guidelines to simplify the process and save resources.

Delivering results on these ambitious device management projects will require committed investment and perseverance. But the industry has little alternative. The time has come to address these challenges in the TM Forum.

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