



# TruManage™ Technology

Remote Management and Control of Mobile and Desktop Clients

## TECHNICAL BRIEF

### INTRODUCTION

A reliable and secure IT infrastructure is essential for every business. This challenge is multifaceted as organizations contend with leaner budgets, limited resources, and increased network complexity. The ability to reduce the cost of maintaining computers around the globe, and in a distributed environment, is becoming a necessity. Various management solutions that address these IT needs are available; however, many of them are system-vendor dependent, require a working operating system, and/or consume significant levels of energy to ensure managed PCs are accessible at all times. These solutions are also proprietary and unique, and include costly IT support customization for each enterprise. This results in an increased total cost of ownership (TCO) and a lack of efficiency and consistency when managing these PC systems.

### Background

Over the last decade, remote PC management has matured to offer a set of resources that facilitate IT tasks by minimizing labor and lowering TCO.

Such capabilities enable basic remote manageability of PC systems (such as hardware/software inventory, alerting, software installation and updates, and so forth) but are limited to working within the operating system. These tools also lack the robust security requirements that are needed in enterprise environments.

IT infrastructure design, stability, and remote management and control now require an elevated level of system flexibility to fulfill these increasingly demanding responsibilities.

This technical brief highlights Broadcom® TruManage technology and specifies how it addresses prevalent IT community concerns. This technology enables remote and secure manageability regardless of the state of the system or operating system, while maintaining high energy efficiency and government agency compliance.



### TruManage Technology Benefits

- Eliminates desk-side visits
- Lowers TCO
- Optimizes PC deployment
- Scalable Out-Of-Band (OOB) Management architecture
- Enables efficient platform provisioning
- Interoperable with mainstream manageability tools

# TruManage™ Technology

## TECHNICAL BRIEF



### TruManage Technology Fundamentals

Broadcom's TruManage technology is built on a scalable Gigabit Ethernet (GbE) controller architecture that combines highly optimized hardware, firmware, and software to enable extremely low-power and cost effective management functionality for in-band, out-of-band, and out-of-service environments.

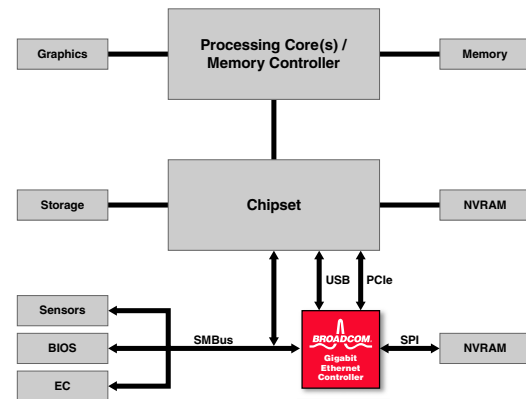
The figure to the right illustrates the incorporation of TruManage technology into the Broadcom NetXtreme® GbE NIC with integrated management controller, and how it is typically implemented in a PC platform.

GbE controllers with TruManage technology integrate an on-chip applications processor and memory to provide a single-chip solution for network connectivity and platform manageability at all times, enabling the proliferation of advanced client manageability throughout the enterprise.

### Practical Application

Broadcom's centralized architecture enables a secure and reliable solution that is less susceptible to system component failures. When the AC power cable is plugged in (and without requiring a boot cycle), a remote IT console can start managing the platform regardless of its state. Network connectivity, along with manageability protocols, is available without the system's operating system support. When TruManage technology is enabled, all firmware and software stacks run exclusively on the controller (for example, Real-Time-Operating-System, network stack, and WS-Man stack including HTTP/HTTPS protocol stacks) and without the need to share any of the system components, such as the system memory, and chipset or processor, which increases the reliability and maximizes availability.

Contrary to Broadcom's centralized solution, some proprietary client manageability methodologies rely on system memory (management firmware operates in system memory) and a continuous power source to support platform components. This is true even when the system is in a sleep state. As a result, competing client manageability solutions are less reliable and less power-efficient, leading to an increased TCO for IT.

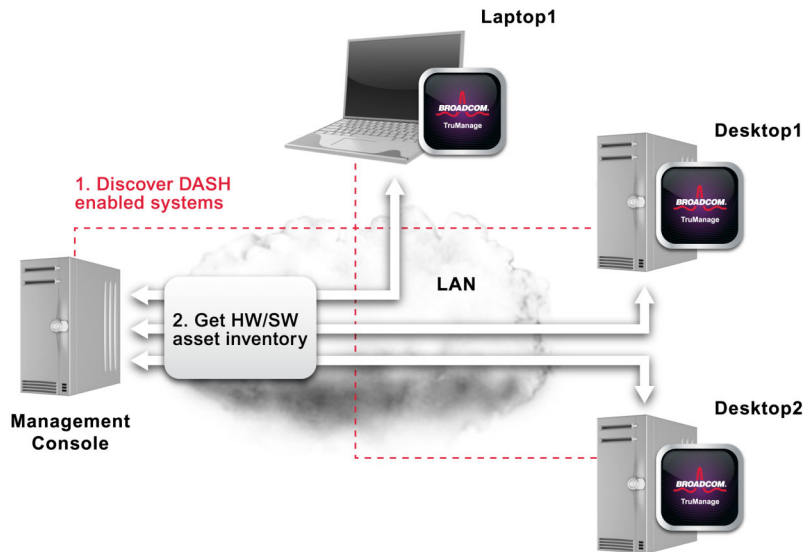


System Architecture with TruManage

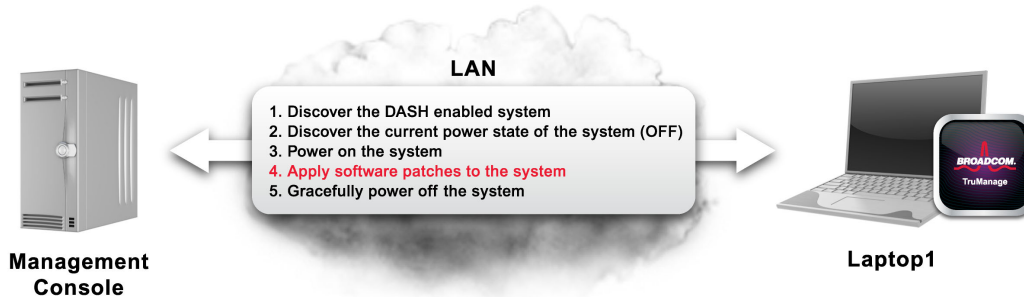
## TruManage Technology Features Highlights



**Asset Management:** TruManage technology enables comprehensive asset tracking of hardware and software inventory including detailed information about the processor(s)/cache(s), system memory, chassis, fan(s), power supplies, and driver/firmware versions. OOB asset inventory is necessary for remotely managing, diagnosing, and repairing the system independent of OS and system power state (on/off/sleep). Advanced logging and reporting provides an easy and effective mechanism for IT managers to monitor the system and be alerted to any change in the system components.



**Power Control:** Systems with TruManage technology can be powered on, shut down, reset, or put in a sleep mode securely from a remote console or web browser. An IT manager can perform a system shut down or reset operation gracefully or ungracefully. The power control feature is essential during the remote diagnosis and repair of a system that fails to boot or run the OS.



**Boot Control:** This allows the boot configurations of the system to be visible and modifiable by an IT manager using the TruManage technology. Both persistent and one-time boot configurations can be supported. The IT manager can use different boot source settings for different boot configurations. The remote boot control feature is useful for reimaging and/or repairing the system. For example, when an OS becomes unresponsive on a system, an IT manager can remotely reboot to a diagnostics environment to detect and analyze OS problems, successfully reimage the system with a new OS image, and reboot the system with the new OS.

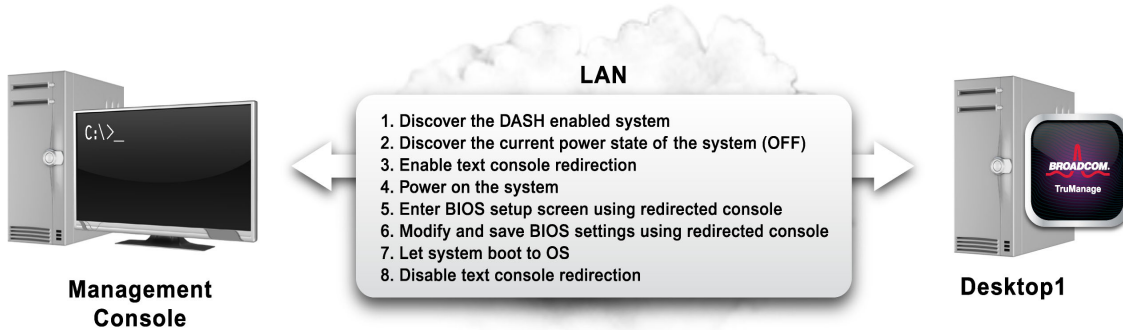


**User Account Management:** This allows the system to efficiently and securely manage distinct platform management tasks assigned to various IT personnel. TruManage technology enables assigned IT managers to be associated with different roles. Each role can be configured to perform different OOB management functions. Supported roles can be dynamically configured. TruManage supports the following aspects of account management:

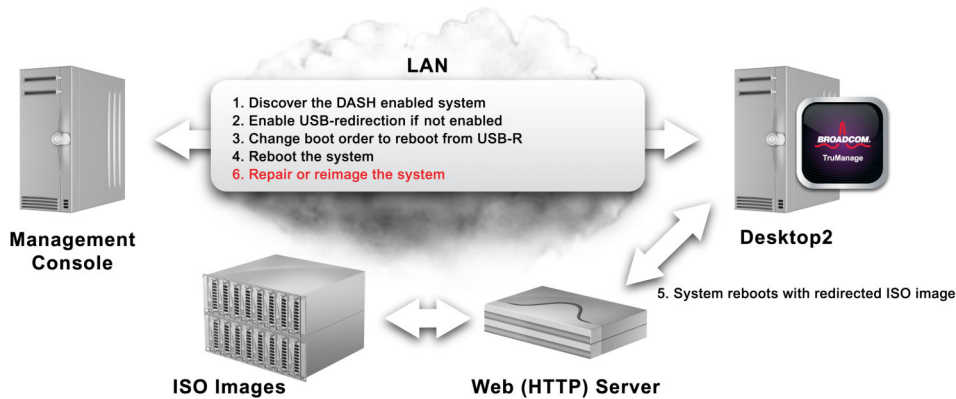
- Creating and deleting an account.
- Changing the enabled state of an account.
- Modifying the user name, organization name, and password of an account.
- Associating an account (identity) with specific roles tied to specific privileges.



**Text Console Redirection:** The ability to remotely monitor and administer a system without a local keyboard, mouse, and video monitor is important for handling the scenario when the system fails to boot or OS fails to load. Text console redirection is a feature that allows for the text console I/O to be redirected to a remote management console. If the IT administrator needs to check or change the BIOS setting on a remote system, the text console redirection feature allows the BIOS menu screen (or any text console) to be redirected to the IT administrator's console. With the local keyboard being locked, the administrator can reconfigure and reboot the system remotely.



**USB Redirection:** This feature provides the ability to remotely boot a system when the local disk is corrupted or the system fails to boot. USB redirection allows an IT administrator to boot from a remote ISO image using an HTTP-based protocol. The USB-redirection device appears as a virtual read-only mass-storage class USB device to the system firmware (BIOS) and OS. The redirection of the control/data to/from the virtual USB device is handled transparently using an HTTP-based redirection protocol. This feature enables remote booting, provisioning, re-imaging, and diagnostics while leveraging the existing USB plug-n-play capabilities, as shown in the figure below. This eliminates desk-side visits and extends the IT manager's accessibility to remote platforms.



**Firmware Update:** The ability to update OOB management firmware using either in-band or an OOB environment allows a management console or an administrator to push fixes to the management firmware as well as update the firmware with new features.



**BIOS Management:** This allows remote configuration and control of the system BIOS using the TruManage technology. The BIOS attributes and settings are visible to the remote management client and BIOS attribute changes can be made programmatically. The TruManage management firmware acts as a cache of BIOS settings and attributes. This feature enables an administrator to roll out BIOS settings changes (e.g., enable TPM) programmatically across multiple systems with TruManage technology.



**Opaque Management Data:** The Opaque Management Data feature provides persistent nonvolatile memory space where the users or applications can store information such as, software version numbers, asset tag, system ID, logs, and software inventory. IT technicians (administrators) can use a remote management console or a local software agent to upload the information in this memory to assist in software-asset inventories, application, OS migrations, and problem resolution. This helps to minimize the reliance on local software agents to store and retrieve data to help prevent accidental data loss. TruManage technology provides the access to Opaque Management Data in both the OOB and In-band environments.



**Event Logging:** This feature provides a log of alert indication related information. This log can be read and cleared. It allows an administrator to have visibility into the events that happened inside the system. The event logging feature enhances the ability to monitor and diagnose a system.

# TruManage™ Technology

## TECHNICAL BRIEF



**Audit Log for Management Operations:** This feature enhances the security of the manageability solution. By accessing an audit log of management operations, an auditor in an enterprise can trace a set of critical management operations performed by a set of users. This feature helps in investigating malicious attacks and security breaches within a system or an enterprise.



**Infrastructure Support:** In order to allow the deployment of TruManage enabled systems in enterprise environments, TruManage technology supports a number of network and security infrastructure technologies including Active Directory (AD), IEEE 802.1X for port-based network access control, IPv6, Transport Layer Security (TLS), and Locally Administered Addresses (LAA).

### TruManage Technology Benefits

Open-standard technology offers increased choice, reduced cost for training and deployment, and improved interoperability in a heterogeneous IT management infrastructure. Broadcom TruManage technology is built on Distributed Management Task Force (DMTF) standards. TruManage supports the DMTF Desktop and mobile Architecture for System Hardware (DASH) Standard that is a suite of specifications that takes full advantage of DMTF's Web Services for Management (WS-Management) protocol and Common Information Model (CIM). TruManage also supports the Management Component Transport Protocol (MCTP), Platform Level Data Model (PLDM), System Management BIOS (SMBIOS), and Alert Standard Format (ASF) 2.0 specifications, which enables a common intercommunication architecture for the TruManage firmware to communicate with other platform management subsystem components, including BIOS, chipset, environmental controllers, and sensor devices.



IT consoles that support DMTF standards can manage any platform with TruManage technology, regardless of the chipset, processor, or OEM vendor. With this flexibility, IT managers won't have to worry about what tools to use to manage a specific platform, or what state the platform is in (sleep or functional). Broadcom is a board member and significant contributor to the DMTF organization.

**Proven and Low-Risk Solution:** TruManage technology provides the best fit for any client platform architecture as it leverages already proven and deployed standards-based mechanisms for internal communications with platform management subsystem components. The TruManage solution has been adopted and deployed by major OEMs in a number of desktop and mobile platforms. The table below shows a number of major management software products and tools that leverage TruManage technology by supporting one or more of the following DMTF standards: DASH, CIM, and WS-Management.

#### Management Software Products

Vendor	Management Software Product or Tool Names
AMD	System Center Configuration Manager (SCCM) Plug-in for DASH, DASH Console SDK including DASH CLI
Broadcom	Broadcom Advanced Control Suite 4 (BACS4) and TruManage Software Development Kit (SDK)
Dell	Dell Client Manager
HP	HP Client Automation Tools
Microsoft	PowerShell, SCCM, Windows Remote Management (WinRM)
Symantec	Altiris Client Management Suite with Real-Time Systems Manager (RTSM) and Out-Of-Band Management

**A Comprehensive Set of Software and Tools:** Broadcom tools simplify the provisioning/configuration aspects of TruManage as well as maintain consistency and coordination between OS-present and OS-absent environments on the system. In order to enable a complete TruManage-based solution, Broadcom provides a comprehensive set of software tools, including: TruManage Software Development Kit (SDK), Broadcom WMI/CIM providers, Broadcom Advanced Control Suite 4 (BACS4), Broadcom Management Agent, Broadcom Management Configuration and Control (BMCC) Utility, and Scripts.



# TruManage™ Technology

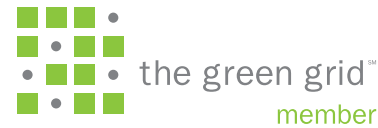
## TECHNICAL BRIEF



**Rich and Competitive Features:** TruManage provides a rich set of features that are use case driven. TruManage features benefit the end users and simplify the deployment of OOB management solutions. The ecosystem including BIOS, environmental controller, chipset, software tools, enterprise infrastructure, and management clients/consales is already in place to realize the full benefits of these features. TruManage technology is the only proven/stable implementation that supports advanced OOB management features like graceful power control, programmatic BIOS management, and USB redirection for desktop and mobile client systems. TruManage technology supports both In-Band and Out-Of-Band update of management firmware that allows IT pros to deploy platforms with different OOB management capabilities and support dynamic upgrade/downgrade of the management firmware in the field. TruManage supports multiple (In-Band, Out-Of-band, and Out-Of-Box) provisioning methods to address different system lifecycles and environments.

**Power-Efficient:** The ability to fully diagnose and repair systems remotely (bare-metal or with a crashed OS) should not be at the expense of increased power consumption. By integrating platform manageability on the LAN controller, Broadcom enables full capability for both network connectivity and platform manageability while drawing minimal power. With

TruManage technology, a green PC can still be fully managed and compliant with EnergyStar™ and other government agencies in the United States, Europe, and globally. The networking subsystem consumes less than 0.2W when the system is in a sleep state -- even while being managed remotely -- resulting in a total system power consumption that is below 1W from the wall. Broadcom is a participating member in the Green Grid industry consortium.



**Easy-Access Web Interface:** In small business environments where a full IT console tool is cost and resource prohibitive, TruManage technology offers the ability to manage any platform on the network using any web browser. A web server runs on the controller hardware and provides a full set of capabilities (power control, asset management, user account management, and so forth) to securely manage, diagnose, and repair systems remotely. This enables direct communication with the remote PC, regardless of its state.

# TruManage™ Technology

## TECHNICAL BRIEF



Features and Capabilities	Related DMTF Standards Publications (DSPs*)
System Inventory and Control	DSP1058, DSP1033, DSP1029, DSP1026, DSP1023, DSP1022, DSP1015, DSP1013, DSP1011
Power Control (including Graceful)	DSP1027
Boot Control	DSP1012
User Account Management	DSP1034, DSP1039
BIOS Management	DSP1061
Opaque Management Data	DSP1070
Indications/WS-Eventing	DSP1054
In-band NIC Management	DSP1014
Sensors	DSP1009
Text Console Redirection (Telnet and SSHv2)	DSP1024
Web GUI / HTML interface	-
Alert Standard Format (ASF 2.0)	DSP0136
SMBIOS Extensions for Sensors	DSP0134
DASH Implementation Requirements	DSP0232
MCTP/SMBus	DSP0236, DSP0237, DSP0239
PLDM	DSP0240, DSP0241, DSP0245
PLDM for SMBIOS Transfer	DSP0246
PLDM for BIOS Control and Configuration	DSP0247
PLDM for Numeric Sensors based Monitoring and Control	DSP0248
WMI/CIM Provider for Ethernet port & SW Inventory	DSP1014, DSP1023
WMI/CIM Provider for User Account Management	DSP1034, DSP1039
WMI/CIM Provider for VLAN Teaming Extensions	-
WMI/CIM Provider for Firmware Update	DSP1025
Certificate Authority Integration	-
IPv6 Phase-2 Logo Compliance	-
USB Redirection (read only mass storage media)	DSP1077
Zero Touch Provisioning	-
Out-Of-Band Management Firmware Update	DSP1025
Microsoft Active Directory Integration	-
Event Log	DSP1010, DSP8007
Audit Log	DSP1010
WMI/CIM Provider for Opaque Management Data	DSP1070
Network Quarantining	-
802.1X Authentication (EAP over LAN)	-
PLDM Platform Event Messages	DSP0248
PLDM State Sensors	DSP0248, DSP0249
Locally Administered Address (LAA) Support	-
Text Console Redirection with Single Sign-on (AD)	-

\*For more information, see [http://dmf.org/standards/published\\_documents](http://dmf.org/standards/published_documents).

## Conclusion

Small and large enterprise IT managers are continuously under pressure to increase the efficiency and reliability of their infrastructure while maintaining lower cost of ownership. Therefore, it is critical for enterprises to have the ability to manage platforms remotely without sending support personnel on-site, while being both vendor-agnostic and energy-efficient.

Broadcom, via its TruManage technology, offers an innovative solution to address IT managers' needs without the tradeoffs inherent in competing proprietary technologies. TruManage technology enables a reliable, secure, energy efficient, and vendor-agnostic solution that can be deployed on desktop PCs, laptops, and workstations, in small, medium, and large businesses. Broadcom TruManage technology is available from major PC OEM vendors.

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