

AMD RYZEN™ PRO 5000 SERIES PROCESSORS THE CHALLENGE: DOING MORE WITH LESS

In current enterprise environments, the need for an efficient PC management solution is clear. IT teams are expected to build, manage, and secure networks that must keep up with increased corporate headcount and device usage. Unfortunately, the ongoing focus on cost control means that even as their workloads get larger and more complex, IT teams aren't being given the additional resources they need.

This means that IT must find new ways to manage the entire hardware lifecycle. Systems must be imaged, provisioned, and deployed. Then it's on to ensuring systems stay up-to-date with the latest updates, from firmware and applications to virus patches and other security fixes. While all these devices are deployed and in use, IT must also make sure they're able to track asset inventory and system health.

This is all hard enough to do with a single location/site. Multiple sites and remote workers can quickly multiply the severity of the challenge, and everybody wants issues resolved ASAP. IT needs every advantage they can get, including a flexible platform that lets them centralize management of all systems, both in- and out-of-band. And they need a consistent set of tools that serve them well no matter which vendor builds the processor or OEM device.

THE ANSWER: FULLY STANDARDS-BASED MANAGEABILITY

That's why an open standards approach to device management serves organizations best, and why AMD believes DASH (Desktop and mobile Architecture for System Hardware) is the best platform for our AMD PRO manageability.

- Lets organizations manage technology as they see fit, with no vendor lock-in
- Enables consistent user and IT experience across any device, for both in- and out-of-band devices
- Continuously evolves to reflect latest industry thinking and best practices

EXECUTIVE SUMMARY: WHAT'S THIS PAPER ALL ABOUT?

Ultimately, it's up to IT to ensure every deployed asset stays productive. This means endpoints must be managed, for both regular maintenance and to help solve urgent issues. Proprietary PC manageability solutions can overload systems with non-essential features, lock organizations into specific vendors, increase costs, and add complexity.

In contrast, AMD PRO manageability is based on open standards and provides organizations with the essential manageability features they need to support business objectives easily and flexibly. This is why AMD continues to work directly with members of leading standards bodies such as the *Distributed Management Task Force (DMTF)* to define standards that support interoperability among system management tools and managed computer systems.

One such standard from DMTF is Desktop and mobile Architecture for System Hardware (DASH). It provides a standard for secure remote management – including out-of-band management – of desktop and mobile systems from multiple OEM vendors and both AMD and Intel processors. The standard defines a common framework for managing most out-of-band maintenance tasks, including:

- remote power control
- boot control, patching
- remote diagnostics
- asset inventory
- security

All in a distributed enterprise environment.

In addition to defining standards, AMD collaborates closely with its partners to implement tools that have a meaningful impact on IT workload. For example, our efforts around the DASH standard have produced a console software development kit (SDK) and a reference implementation – AMD Management Console (AMC) – that are freely shared as open-source tools. We always encourage customers to learn more about the DASH standard in order to choose the best tools and technologies for their client management needs.

WHAT'S IN THE PAPER

In this paper, we will focus on the essential client management features that we've built into every AMD Ryzen™ PRO processor. Learn how AMD PRO manageability built on DASH helps solve for out-of-band management in ways that safeguard critical business productivity while maintaining control of IT costs. We'll then dive deep on DASH use cases in detail.

AMD PRO MANAGEABILITY – THE POWER OF STANDARDS IN ACTION

AMD PRO manageability brings both in-band and out-of-band manageability together in a single solution that IT organizations can use to manage their PC fleet. Once integrated with popular in-band management consoles like Microsoft's System Center Configuration Manager (SCCM) and Microsoft Endpoint Manager (MEM), it allows IT organizations to use a single console for both in- and out-of-band management. This dramatically simplifies the infrastructure and tool requirements needed to manage DASH-compliant systems.

Combining the power of in-band management with industry-standard, vendor-neutral, platform-independent DASH out-of-band manageability greatly eases IT management headaches. This means no more worrying about systems being on for after-hours patch management, since DASH lets users accelerate patch saturation by powering on all systems for a critical push. Then, once all patches have been deployed, systems can be powered off to help conserve energy. And it all happens inside one console across all DASH-compliant systems.

WHY CHOOSE AMD PRO MANAGEABILITY AND DASH?

Choosing only fully DASH standards-compliant manageability solutions helps put the power of choice back into the corporate IT organization by providing four major benefits:

- Avoid getting locked in and restricted to a limited, small set of vendors and system models
- Gain the simplicity of one set of console tools that support all standards-based systems versus requiring separate tool sets for proprietary and standards-based systems
- No more paying for lots of unnecessary manageability features just to obtain essential core capabilities
- Reduce IT costs while increasing the ability to respond to business needs and keep pace with internal and external change



As we have seen in recent years, relying on a single vendor or proprietary technology can be impractical and limiting, often locking companies into a purchasing decision. The resulting solution may be inferior in performance and battery life, as well as limiting in terms of supply chain flexibility and cost.

This proprietary lock-in can also cause an organization to lose the flexibility required to quickly respond to the changing needs of different user groups across the organization. As computing technologies continue to rapidly evolve, proprietary solutions can jeopardize security and stability – and even company competitiveness – if they cannot keep up with new requirements.

CHANGE DRIVES COMPLEXITY

When this happens, organizations are forced to add another vendor's solution into their environment, with the process often repeating for each new vendor's client devices. The result is increased management complexity driven by the inability of proprietary solutions to integrate and connect with standards-based platforms. As we can see in [Figure 1](#), the choice between proprietary and standards-based can resonate far beyond manageability concerns.

DEFINING ESSENTIAL MANAGEABILITY

To make the best management platform choice, organizations need to start by defining "essential" use cases. These are the required

core set of tasks that make up the majority of daily client system management, and those necessary to keeping an organization's PCs up and running.

This requirement gathering process is important because, as mentioned previously, proprietary client management solutions often include many features that are not absolutely necessary for day-to-day management. While vendors are obviously incentivized to encourage this type of "just in case" buying mentality, it forces most organizations to pay for features they don't need. It isn't just the higher up-front cost, either, since this kind of feature overkill bloats environments and detracts from essential manageability tasks.

While each organization has unique manageability priorities, it's useful to take a look at qualitative data to see how your various commercial organizations' compare. According to a survey of over 400 ITDMs conducted by Spiceworks in 2020, 63% of respondents indicated that they spend most of their time using OS-level (in-band) tools to troubleshoot a PC while the OS is still running.

IN-BAND OR OUT-OF-BAND

It's worth looking at how in-band and out-of-band solutions complement each other as part of a big-picture manageability solution. [Figure 2](#) shows an overview, followed by an in-depth discussion of each option.

Comparing Standards-based and Proprietary Solutions

Figure 1

PROPRIETARY

Reduces choice and the ability to respond to changing business needs

Increased Complexity, Reduced Interoperability

Managing multiple solutions can add to IT overhead

May Increase Management Costs

May have to pay for an array of solutions and unneeded features

STANDARDS-BASED

Increases Flexibility and Choice

Companies can use the mix of IT solutions that best meets their needs

Simplify Management

Uniform management tools and consistent processes decrease complexities

Reduce IT Management Costs

Simplify management of multi-vendor, distributed enterprise environments

IN-BAND

Effective in-band management solutions, which work through software running in the OS, are perhaps the most important tools for managing desktop and mobile client systems. Many organizations already rely on in-band client management solutions such as Microsoft System Center Configuration Manager (SCCM), Microsoft Endpoint Manager (MEM), or other similar solutions. These solutions are hardware agnostic, enabling users to fully manage both AMD and Intel powered systems with a single unified solution.

The bulk of all client manageability can be performed with in-band tools. Therefore, to realize cost savings and reduce downtime, IT organizations should first focus on effective in-band client system management. Actively using existing in-band management tools and applying best practices while the client PC is powered on with the operating system up and running can result in substantial operational savings.

OUT-OF-BAND

There are times, however, when IT needs to manage a system that is powered off or otherwise in a state where the operating system is unavailable. This is when out-of-band manageability has additional benefits. Once an organization has solid in-band tools and best practices in place, IT can begin to realize additional benefits by adopting essential out-of-band management capabilities.

The greatest time and cost savings from out-of-band manageability come from being able to complete a few essential tasks on systems while they're powered off or otherwise unavailable. As we learned earlier, these are also core DASH use cases.

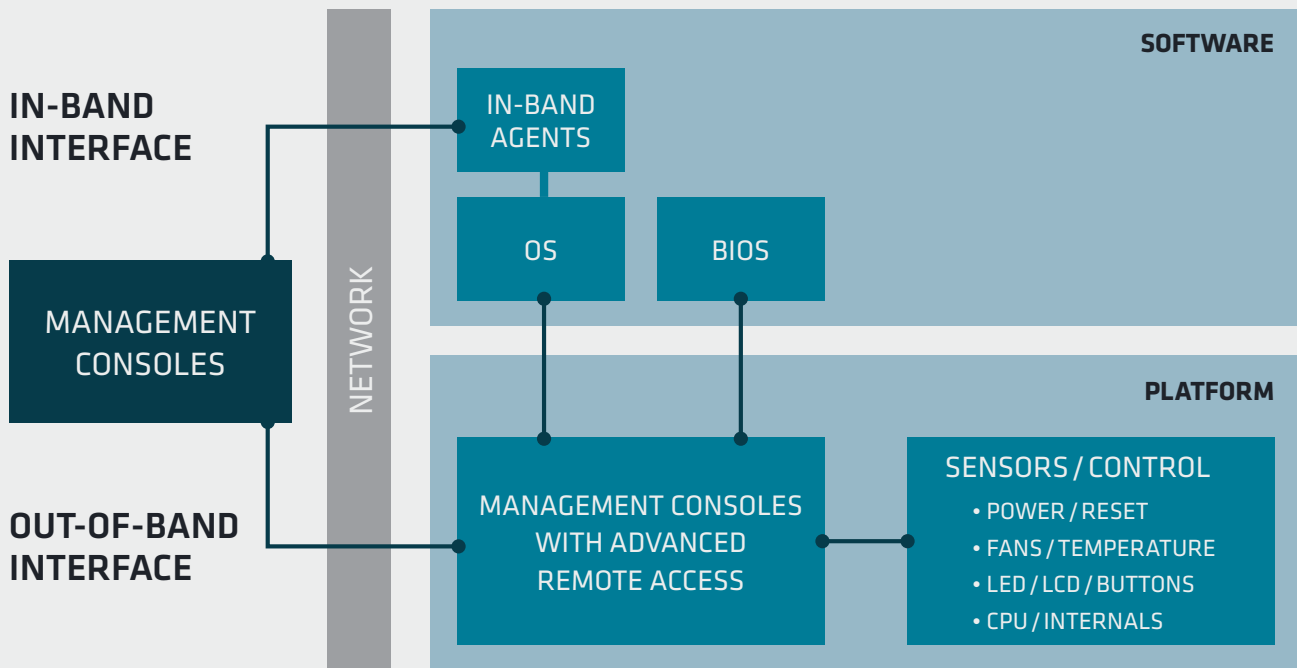
- Remote power control
- Accelerated, automated security updates and virus patches
- Remote diagnostics
- Asset inventory
- Remote BIOS control
- Security

Real-world experience shows that these essential tasks cover the majority of out-of-band use cases, while generating the greatest operational benefits.

As we've already learned, selecting proprietary solutions (even those with additional features) can introduce risk into the environment. This is one reason DASH has gained considerable momentum and acceptance as an open standard for secure out-of-band and remote management of desktop and mobile systems in multi-vendor environments.

Out-of-band and In-band Client Management

Figure 2



A CRITICAL COLLABORATION: AMD, DMTF, AND THE DASH STANDARD

The Distributed Management Task Force is a not-for-profit association dedicated to promoting systems management and interoperability through standards development. The DMTF enjoys broad industry support, with participants from more than 200 member organizations including major silicon providers such as AMD, Intel, Nvidia, Qualcomm, and ARM, as well as top enterprise OEMs such as HP, Lenovo, and Dell.

AMD actively works with other DMTF members to collaboratively define standards that encourage increased interoperability among vendor solutions. Our goal is to ensure that these management standards are always relevant to real IT needs, making it easy for customers to manage increasingly diverse environments. We also collaborate closely with our partners to create tools and technologies that support real-life management requirements, including SDKs, reference implementations, and various test tools.

Why do we believe so strongly in DASH?

- DASH open standards create **long-term stability while fostering interoperability** among vendor solutions. Client PCs that employ the DASH standard to enable all essential features promote greater choice among a wider range of vendors, giving IT organizations greater flexibility to respond to changing business requirements without adding unnecessary complexity to their environments.
- Vendors also benefit from the flexibility of the DASH open standard because they can **deliver a broader range of solutions with varying levels of functionality**. This translates into more satisfied customers that have solutions tailored to their business needs.
- Standards-based applications and technologies **lower overall management costs by centralizing tools and simplifying tasks**. Instead of learning a set of proprietary management tools for each vendor, IT administrators can use a single set of tools to manage systems from multiple vendors, lowering management complexity for heterogeneous environments.
- Standards free IT organizations to focus on **meeting business needs rather than juggling specialized tools** for managing specific systems.

Ultimately, we believe DASH is the right path for industry innovation and offers the best possible experience for most customers.

IN DETAIL: AMD PRO MANAGEABILITY USE CASES

The promise of open standards is enticing, but how will AMD PRO manageability really affect an organization's daily client management tasks?

Significantly.

AMD PRO manageability tools and technology let users remotely perform routine and emergency management tasks on clients that are powered off (out-of-band) or whose operating systems are not functioning (out-of-service), all using common, standards-based technology. We highlight a few here:

REMOTE POWER CONTROL

Just being able to remotely turn a computer on or off can greatly simplify daily client management tasks. AMD PRO manageability enabled clients can be powered on remotely using the secure, robust Wake-on-DASH capability via the WS-Management protocol, which provides a secure, session-based mechanism for powering on remote client systems.

Because AMD PRO manageability uses this robust mechanism to remotely power on client systems, users can allow (or force) PCs to go into sleep state to reduce energy consumption, and then securely power them back on when it's time for maintenance.

This can be compelling for IT organizations that manage remote sites with a large number of clients used only at certain times, such as a bank's branch offices. Instead of relying on employees to power PCs on and off, tasks can be automated on the management console, saving electricity without manual intervention.

ACCELERATING PATCH SATURATION

Applying updates and security patches can make up a significant part of an IT administrator's daily routine. While in-band client management solutions make it fairly easy for systems that are powered on, clients with AMD PRO manageability simplify things even more by updating and patching remote systems that are powered off.

For example, suppose a team needs to apply a critical security patch after hours, and half of the clients are powered off. An environment with AMD PRO manageability clients makes this task very simple. Using a team's preferred management console, they can select the affected clients and initiate an automated patching task.

For the clients that are powered on, the task is completed the same way it always has been. For powered-off clients with AMD PRO manageability:

1. The automated task starts the client using the power control capability defined in the DASH Power State Management Profile,
2. Checks its status,
3. Applies the patch.

In this example, any DASH-enabled system, regardless of vendor, can be updated whether it is on or off, or has a functioning or non-functioning operating system.

REMOTELY DIAGNOSE AND RE-IMAGE

AMD PRO manageability can reduce the high cost of desk-side visits by letting IT perform diagnostics and troubleshooting on remote systems that are out-of-band or out-of-service. The DASH-enabled console lets you test remote systems for problems like hardware component failures, BIOS configuration problems, operating system driver conflicts, and others.

Here's a hypothetical.

After crashing several times, a desktop client with AMD PRO manageability in the sales department is now failing to boot up properly. Using a standard DASH-enabled console such as AMC or SCCM with AMPS, you can access the sales desktop, remotely boot it, and redirect the serial console output to a management console for remote troubleshooting.

Fully KVM-enabled systems let you view the full boot process. If the PC refuses to boot, you can boot from a diagnostic image and continue troubleshooting. After identifying the cause of the problem, you can remotely take corrective action such as installing new drivers or reimaging the system. You can remote-boot by redirecting it to boot from a different image, such as a network share or other boot device. You can even remote boot a PC that has a corrupted OS or no OS installed.

Having access to asset inventory information, particularly the physical asset details, can help reduce desk-side visits required to troubleshoot and replace a faulty part.

And another typical scenario:

The platform cannot boot due to hardware issues such as boot drive corruption or memory failure. Using the DASH inventory profile, an AMD PRO manageability enabled client could provide product name and version information for installed software, while the Physical Asset profile would specify part number, serial number, and model information for Field Replaceable Unit (FRU) hardware components, such as a drive or memory.

Because DASH enables out-of-band management, you can collect hardware and software inventory information independent of a client's system state. Having access to this information, particularly the physical asset details, can reduce the number of desk-side visits required to troubleshoot and replace a faulty part. Teams can identify the correct FRU needed for the repair that takes place during the first, and hopefully only, desk-side visit.

AUDITING - ASSET INVENTORY

AMD PRO manageability can also help with inventory management. Conventional tools for hardware asset discovery typically operate on an in-band basis only. They will also fail if the target is powered off or if the OS is missing or non-functional. They may also be

inaccurate, as users can intentionally or inadvertently remove agents used for auditing. For this reason, IT organizations have traditionally either depended on users to report their IT assets, or they have sent IT staff to check on the assets manually.

The discovery and inventory features of the DASH standard make it easy to conduct hardware and software inventories for desktop and mobile clients with AMD PRO manageability, regardless of whether they are powered on or off. The automated discovery process lets IT administrators identify which clients on the network are DASH-enabled and which out-of-band management capabilities are supported.

This discovery process could be done against a single IP address, a range of IP addresses, subnet, or Active Directory. For example, after discovering the DASH-enabled clients on a network, IT could query a system that is powered off and display the hardware asset information collected by the AMD PRO manageability implementation.

Teams could also specify that inventory data collected via DASH be stored along with asset information available in their favorite management tool. Whether auditing hardware or software, these features speed and simplify inventories because IT can gather and centralize needed asset information whether the client is on or off.

Remote access to asset information can help better optimize maintenance contracts, warranties, and configurations, as well as plan for repurposing of underutilized platforms. Increasing the volume and quality of information enables better decision-making that can directly impact the organization's bottom line.

IN DETAIL: AMD PRO MANAGEABILITY FEATURES

The management features defined by the DASH standard give IT administrators the ability to accomplish essential out-of-band client management tasks such as patching and updating, remote diagnostics, asset inventory, BIOS configuration, and security.

The following table ([Figure 4](#)) illustrates how DASH manageability features support these essential IT tasks. When implemented in DASH-enabled tools and technologies, these features will provide additional capabilities that further simplify client system management.

AMD PRO manageability provides multiple tools that can be used to manage supported systems via DASH standard for secure Out-of-Band (OOB) and Web Services Management (WS-MAN). Some of these solutions are standalone while others allow integration into existing in-band management solutions.

- **AMD Management Plugin for SCCM (AMPS) - AMPS**

USE CASE	BENEFITS
REMOTE POWER CONTROL	<ul style="list-style-type: none"> • Manages power consumption • Helps reduce electricity costs and manage power usage • Helps manage carbon credits • Helps active greater productivity • Lets you focus on meeting business needs
ACCELERATING PATCH SATURATION	<ul style="list-style-type: none"> • Reach “patch saturation” more quickly • Update any DASH-enabled system regardless of vendor • Location, system state, and power state do not matter
REMOTELY DIAGNOSE AND RE-IMAGE	<ul style="list-style-type: none"> • Helps reduce the need for desk-side visits • Troubleshoot and repair remotely • Helps reduce or even eliminate desk-side visits • Help decrease user downtime and optimize productivity
AUDITING - ASSET INVENTORY	<ul style="list-style-type: none"> • Gather information regardless of client system or power state • Helps reduce or eliminate manual platform audits • Store inventory information in a central repository • Helps to efficiently and effectively manage software licenses • Helps improve compliance with business practices

extends Microsoft System Center Configuration Manager (SCCM) and Microsoft Endpoint Configuration Manager (MECM) to support management tasks using DASH.

- **AMD Management Console (AMC)** - AMC is a GUI-based application for small business environments, capable of monitoring and managing up to 500 DMTF’s DASH-compliant clients. AMC supports KVM redirection for graphics-based BIOS setup screen.
- **AMD DASH Command Line Interface (CLI)** - AMD DASH CLI is an application used to perform out-of-band management tasks (power management, asset inventory, alerts, etc.) using DMTF DASH specifications (supports 2.33 DMTF schema) against a DASH target from a shell. AMD DASH CLI provides scripting interface and runs as a shell.

DASH SECURITY

Securely managing clients is a fundamental part of daily client management. AMD PRO manageability supports security by providing DASH transport-level security and user-level security with supporting role-based authentication and authorization. These two levels of security give IT administrators the flexibility they need to control access to network resources and protect sensitive management data.

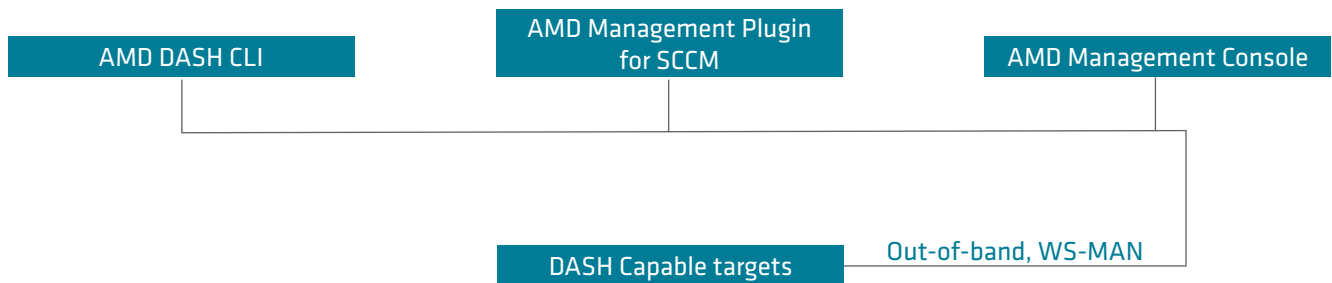
TRANSPORT-LEVEL SECURITY

DASH’s transport-level security ensures the integrity of messages sent between clients and management consoles, as well as authenticating the originating machine’s identity. It also offers encryption support for messages at the transport level. Because DASH specifies industry-standard protocols such as HTTPS and TLS for transport level security, IT administrators do not have to deal with complications arising from ports or worry about how management traffic is routed.

Management Feature	Supported Essential Management Task			
	Patching & Updating	Remote Diagnostics	Asset Inventory	Security
Remote Power Control	•	•	•	
Boot Control	•	•		
Event Reporting / Platform Alerts		•		
Correlatable System ID (unique vendor-independent ID)	•	•	•	•
Firmware Version	•	•	•	
Hardware (chassis model/serial, CPU, memory, fan, power supply, sensor)		•	•	
Login Credentials				•
Roles and Privileges				•
BIOS Management	•	•	•	•
Firmware Update	•	•		
Serial/Text Console Redirect	•	•		
USB Redirection	•	•		•
Operating System Status		•		
Opaque Data Management (offline mailbox)	•	•	•	
Battery Management		•	•	
TLS 1.3				•

AMD client manageability tools managing DMTF DASH targets

Figure 5



DASH delineates two classes of security:

CLASS A

Class A requires HTTP digest authentication, and no encryption capabilities are required beyond password encryption during digest authentication exchange. If implemented, MD5 digest algorithm is supported.

CLASS B

Class B defines three security profiles that are based on either TLS or IPsec with selected modes and cryptographic algorithms or cipher suites. For class B compliance, support for at least one of these security profiles is mandatory: TLS 1, TLS 2, IPsec.

The DASH implementation needs only to support either Class A or Class B, but for highest security the DASH implementation should be Class B compliant.

USER-LEVEL SECURITY

In addition to the transport-level security, DASH also defines role-based user-level security for authentication and authorization. The standard includes three operational roles that support user-level authentication and authorization:

- **Read-only user:** Allows the user to perform query and read operations on managed clients
- **Operator:** Allows the user to perform read, write, and execute operations on managed clients. Operators can change values, settings, and the state of managed clients.
- **Administrator:** Allows the user to perform read, write, execute, create, and delete operations on managed clients. Administrators can change values, settings, and the state of managed clients. They can also carry out user account management operations.

All DASH implementations must support the administrator role. The administrator performs account management for all other users.

In addition, the specification allows developers to add account management features to each role, as well as create additional roles as needed for finer control of access to various manageability functionality. By including role-based security, DASH-enabled solutions offer IT administrators considerable flexibility in assigning management tasks to different IT employees, purposely limiting the functionality to only those that need the functionality access.

Since DASH supports username/password and role-based authentication, DASH-enabled consoles and clients can be configured to use single sign-on authentication against a directory. DASH authentication can be transparently mapped to a Microsoft Active Directory.

When a user signs on to a DASH-enabled management console, the console looks up the credentials for the DASH SMSUSER in the directory and authenticates with the MAP on a managed resource using this login. While the MAP in this example would have to be separately configured with the credentials, the end result is single sign-on authentication and authorization for administrators.

DASH PROFILES

DASH defines profiles, documents that describe how parts of the DMTF Common Information Model (CIM) behave in desktop and mobile computers and their associated hardware, on top of the base CIM. DMTF has defined over 50 management profiles to date.

Note: Ultimately, our OEM partners determine which profiles are available per device. Customers should check with the manufacturer to confirm.

When selecting a client PC that claims to be DASH compliant, be aware that the DASH standard only requires seven (7) profiles as mandatory, and all others are optional.

That means a client PC can be DASH compliant but only support a few DASH standard-based features while having other major features all proprietary.

ITEM	PROFILE / SPECIFICATIONS	FEATURE / USE CASE	PROFILE / SPECIFICATION
1	Base Desktop and Mobile	Asset Inventory	DSP1058
2	Profile Registration	List Supported Profiles	DSP1033
3	Role-Based Authorization	User Authority	DSP1039
4	Simple Identity Management	User Administration	DSP1034
5	WS-Management Specification	Base DASH Protocol	DSP0226
6	WS-Management CIM Binding Specification	Base DASH Protocol	DSP0227
7	WS-CIM Mapping Specification	Base DASH Protocol	DSP0230
8	Power State Management	Remote Power Control (DASH Power Control) and Graceful Soft Shutdown	DSP1027
9	CPU	Hardware Inventory – Processor	DSP1022
10	System Memory	Hardware Inventory – Memory	DSP1026
11	Fan	Hardware Inventory – Fan	DSP1013
12	Physical Asset	Hardware Inventory – Asset	DSP1011
13	Ethernet Port Profile	Hardware Inventory – LoM/NIC	DSP1014
14	SSH Service	SSH Service Management	DSP1017
15	Battery Profile	Battery Status: Present, Battery Status, Estimated Run Time	DSP1030
16	Power Supply Profile	Hardware Inventory - Computer	DSP1015
17	Software Inventory	Software Inventory: BIOS, DASH FW, DASH Driver	DSP1023
18	DHCP Client	DHCP protocol	DSP1037
19	DNS Client	DNS protocol	DSP1038
20	IP Interface	IP Interface Description and Configuration (IPv4, IPv6, DNS, DHCP, IP address, subnet, default gateway)	DSP1036
21	IP Configuration	Specification of IP network configuration, support for managing configs	DSP1116
22	OS Status	OS Status	DSP1029
23	Software Update	Management Firmware Update (Remotely)	DSP1025
24	Boot Control	Set Boot Control	DSP1012
25	Text Console Redirection	Text Console Redirection – Serial Redirection	DSP1024
26	USB Redirection	USB Redirection for file/image access	DSP1077
27	Service Processor	Management and configuration of Service Processors (SP/MP/BMC)	DSP1018
28	Record Log	System Log	DSP1010
29	Sensor	PLDM/MCTP Interfaces for Health monitoring (fan speed, temp, etc.)	DSP1009
30	Indications	Platform Alerts – Also requires System HW Sensor Support	DSP1054
31	KVM Redirection	Keyboard, Video, Mouse Redirection	DSP1076
32	BIOS Management	BIOS Management	DSP1061
33	Telnet Service	Specification/Config of Telnet Service	DSP1016
34	Host LAN Network Port	Network Port Management	DSP1035
35	Physical Computer and System View	System Component View	DSP1108
36	PCI Device	Represent PCI devices for manageability	DSP1075

SUMMARY

Ending with the profile discussion is a good way to gauge the scope and simplicity of the AMD PRO platform built on DASH visibility and control. It's a single tool for leveraging lots of asset information in real-time, reducing the time and attention required to keep a fleet of PCs – no matter the size – connected and productive.

DASH utilizes an open, industry-standard set of access protocols—essentially web services—to manage out-of-band desktop and mobile clients, and provides the functionality to securely perform essential management tasks such as remote power control, updates and patches, remote diagnostics, and asset inventory. And because DASH is an extensible management framework, it will grow to support new client manageability features.

Built with this promise in mind, AMD PRO manageability provides organizations with the essential manageability features they need to support business objectives easily and flexibly, today and tomorrow.

With an open standards design that not only works within an existing environment but also enables true freedom of choice, AMD Ryzen™ processors with AMD PRO technologies deliver to commercial customers the modern performance, security features, and seamless management needed inside the most demanding business and technology environments.

ADDITIONAL RESOURCES

DMTF

- DMTF: <https://www.dmtf.org/>
- DASH: <https://www.dmtf.org/standards/dash>
- DMTF Members: <https://www.dmtf.org/about/list>
- Join DMTF: <https://www.dmtf.org/join>

AMD PRO manageability

- AMD PRO Manageability: <https://www.amd.com/en/technologies/security-manageability>
- Tools for DMTF DASH: <https://developer.amd.com/tools-for-dmtf-dash/>
- AMD Ryzen™ PRO Processors Ease Headaches for IT Pros: <https://www.amd.com/system/files/documents/ryzen-pro-article-ease-headaches-for-it-pros.pdf>

AMD Ryzen™ PRO processors

- AMD Ryzen™ Desktop Processors with PRO Technologies: <https://www.amd.com/en/ryzen-pro>
- AMD Ryzen™ Mobile Processors with PRO Technologies: <https://www.amd.com/en/products/ryzen-pro-processors-laptop>
- AMD PRO Technologies: <https://www.amd.com/en/technologies/pro-technologies>

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