

SOLUTION OVERVIEW

INCREASE BANDWIDTH AND FUTUREPROOF YOUR MOBILE-FIRST CAMPUS

Take advantage of 802.11ac Wave 2 with HPE Smart Rate multi-gigabit Ethernet

A NEW ERA OF CONNECTIVITY

The digital workplace is placing crushing capacity demands on campus networks. Dramatic Wi-Fi growth and business dependence on reliable, secure wireless access along with bandwidth intensive multimedia and collaboration tools sets the stage for performance bottlenecks impacting employees, customers, and business productivity. Wi-Fi has jumped ahead with multi gigabit 802.11ac Wave 2 wireless technology and now the wired campus must upgrade to a foundation that takes full advantage of this increased performance capacity. Today's cabling systems were designed for 1 Gigabit Ethernet and moving up to 10 Gigabit Ethernet has often required extensive wiring upgrades. Fortunately, the new [IEEE 802.3bz](#) standard for multi-gigabit Ethernet delivers both high speed and power for 802.11ac Wave 2 devices while using existing CAT5e and CAT6 twisted pair wiring, saving the rip and replace expense and complexity of a new cabling infrastructure. At Aruba, a Hewlett Packard Enterprise company, we call this new multi-gigabit Ethernet technology, HPE Smart Rate.

DEMANDS RESHAPING THE NETWORK

The skyrocketing population of smartphones, tablets and Internet of Things (IoT) devices combined with high-bandwidth workloads moving across wireless networks requires that the campus network infrastructure evolve to meet these demands. This transformation means enterprises need to upgrade their WLAN infrastructure to support increased traffic, performance and security requirements. Bring Your Own Device (BYOD) adoption, the rollout of Internet of Things (IoT) solutions, and the adoption of cloud storage and backup solutions are pushing the WLAN infrastructure to the limit. This is reflected in the

emergence—and rapid adoption —of 802.11ac Wave 2. There are several important factors driving the transition to Wave 2.

- **Mobile Traffic Growth:** IoT devices, BYOD and unified communications (UC) adoption will continue to increase WLAN bandwidth demands, forcing 802.11ac Wave 2 upgrades.
- **Access Capacity:** New 802.11ac Wave 2 capable devices significantly increase access performance demands on supporting cabling to nearly 4Gbps. Future waves of 802.11ac could support up to the maximum data rate of the 11ac standard of 7Gbps.
- **Rapid Adoption:** Enterprise 802.11ac Wave 2 access point adoption is projected to grow faster than 802.11n did. By 2018, the adoption rate for 802.11ac Wave 2 will reach 100%.¹ The increase in Wave 2 devices will drive MU-MIMO² adoption, putting additional bandwidth stress on the WLAN.

When enterprises replace legacy APs with 802.11ac Wave 2 APs, they will see an immediate increase in WLAN capacity. However, one bottleneck remains that could prevent many businesses from capitalizing on these advancements — the existing cabling infrastructure and the speed of the switch port that the AP is connected to. Most of the Ethernet cabling deployed worldwide today is limited to 1Gbps at 100 meters and until now, adding bandwidth has meant major new cabling investments.

FUTUREPROOF THE WIRED CAMPUS NETWORK

HPE Smart Rate multi-gigabit Ethernet technology solves this cabling infrastructure bottleneck without ripping and replacing existing twisted-pair cabling. Using the existing cabling infrastructure both protects existing investment and simplifies upgrades to higher speed solutions.

¹ DellOro 2016 Wireless LAN update 2Q16

² MIMO—Multiple Input/Multiple Output—is a technology for multiplexing multiple data streams over a single radio channel. MU-MIMO—Multiple User-MIMO—is an enhanced form of the MIMO technology that enables multiple independent radio terminals to access a system. These technologies encourage even greater usage of high bandwidth applications.

What is HPE Smart Rate?

HPE Smart Rate is a new multi-gigabit (1, 2.5, 5, 10Gbps) twisted-pair network interface that is interoperable with the NBASE-T ecosystem of 2.5/5Gbps products as well as with existing industry standard 1GbE/10GbE devices. It allows the majority of existing cable installations found in campus LAN environments to provide higher bandwidth connectivity, distribute PoE power to connected devices, and secure the wired-link for next-generation 802.11ac applications.

- Smart Rate delivers 2.5-10 times more bandwidth capacity from existing cable infrastructure without expensive and disruptive cable upgrades.
- Smart Rate switch ports provide up to 30W of Power over Ethernet, regardless of the port speed. The mechanism used in Smart Rate for delivering and receiving power over twisted-pair structured cabling is identical to and fully-compliant with the IEEE's 802.3at PoE+ specification. Customers can continue to power existing and future access points and accessories, regardless of bandwidth and link speed requirements.

- Smart Rate ports are auto-negotiating, which enables the Ethernet link to settle into the highest speed that can be achieved on a given cable configuration.
- Smart Rate ports on Aruba campus switches support industry standard 802.1AE MAC layer encryption to ensure data confidentiality and integrity for improved switch-to-switch security.

Cabling considerations

Factors such as cable type and environmental noise influence the maximum cable length of the link. The presence of environmental noise (often referred to as Alien Noise or Alien Crosstalk) significantly degrades the link's Signal-to-Noise Ratio (SNR) and can restrict the maximum cable reach of the link. 2.5 Gbps mode will be a very convenient upgrade as it is supported on same cable types as 1Gbps. Distances supported for Ethernet speeds and cable type available below in table 1:

HPE Smart Rate Features	Benefits
Multi-rate 1Gbps, 2.5Gbps, 5Gbps, and 10Gbps with auto negotiation on a single switch port with support for operation over twisted-pair cabling.	Provides additional bandwidth, which is required because of the increasing demand in mobile campus environments, for now and into the future.
Higher-speed Ethernet on existing cabling infrastructure.	Uses existing cabling infrastructure while providing added bandwidth to emerging WLAN and data intensive access applications. Uplink at 5 G over CAT 5e or better.
IEEE 802.3 compliant 1Gbps and 10Gbps modes interoperate with existing 1Gbps and 10Gbps ports.	Protects investments in existing switch-to-switch infrastructure while providing the flexibility to move to 2.5Gbps or 5Gbps, when needed.
MACsec enabled on all HPE Smart Rate switch ports.	Provides industry standard secure link-level encryption between two points of their twisted pair links.
IEEE 802.3 compliant 30W Power over Ethernet on all link speeds	Powers existing and future access points and accessories, regardless of their bandwidth and link speed requirement.

TABLE 1

Mode	Cable type	Cable length
1Gbps (1000BASE-T)	CAT5e/Class D or better	Up to 100 meters
2.5Gbps Available when link partner is either 802.3bz-compliant, HPE Smart Rate, or NBASE-T compliant.	CAT5e/Class D or better	Up to 100 meters
5Gbps Available when link partner is either 802.3bz-compliant, HPE Smart Rate, or NBASE-T compliant.	CAT5e/Class D	Up to 55 meters in a high Alien noise environment Up to 100 meters in a low Alien noise environment
	Shielded CAT5e/Class D	Up to 100 meters
	CAT6/Class E or better	Up to 100 meters
10Gbps (10GBASE-T)	CAT6/Class E	Up to 55 meters
	CAT6A/Class E _A	Up to 100 meters

Note: Class E_A requirements in ISO/IEC 11801

SUPPORT FOR MULTI-GIGABIT ETHERNET STANDARDS

Aruba consistently delivers standards-compliant, rather than proprietary solutions to the marketplace. HPE Smart Rate technology was first to market and is interoperable with the NBASE-T ecosystem of 2.5G and 5G multi-gigabit Ethernet products today and the new IEEE 802.3bz standard. This new standard relies on the NBASE-T technology baseline, enabling the existing Aruba products to be updated to new standard with a simple software update.* The Power over Ethernet on Smart Rate technology is based on IEEE 802.3at PoE+ and provides up to 30 watts (PSE)/25.5 watts (PD) to all standards-compliant powered devices.

ARUBA CAMPUS SOLUTIONS

Aruba takes a mobile-first approach to create the foundation for the digital workplace and meet the performance, visibility, and security challenges that IT faces in building an infrastructure. With an integrated wired and wireless portfolio, and advances in network management and security, best-in-class organizations can design their enterprise network to be ready for the digital workplace.

802.11ac WLAN

Aruba's 802.11ac Wave 2 portfolio delivers an enterprise-grade, stable wireless solution so that mobile users can roam while accessing business applications and data. Enterprises moving to voice and video calling on Wi-Fi need to design both the wired and wireless networks to support those apps. Aruba's Wave 2 APs (330 series) deliver superb performance in high-density environments and add support for multi-User MIMO (MU-MIMO), 4 Spatial Stream support (4SS) and HPE Smart Rate, supporting 1, 2.5 and 5G.

Campus switching

Aruba's campus switch portfolio provides a truly integrated wired-wireless foundation for the digital workplace. Scalable, innovative platforms deliver power and performance with security, policy and application optimization for enterprise, small and medium businesses, and branch office networks. The Aruba 5400R, Aruba 3810 and new 2930M Switch Series support Aruba AirWave management and Aruba ClearPass Policy Manager, and are ready for Wave 2 APs with HPE Smart Rate ports.

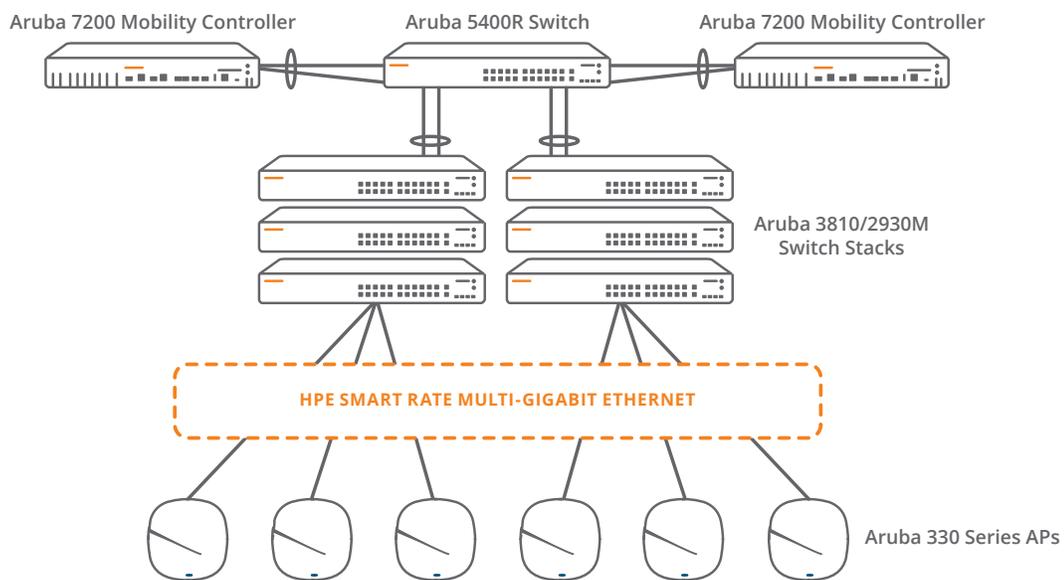


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*Software update available Q3 2017.

PRODUCT SUPPORT AND MIGRATION SERVICES

HPE Services offer full end-to-end project lifecycle and support services for Aruba wireless solutions. Our network specialists will help create a clear transition plan to migrate your existing networks to newer standards and architectures, including wired and wireless network integration.

HPE consulting services bring the networking expertise required to integrate new and existing products and technologies. Our wireless services experts will help deliver and expedite WLAN assessment, design, and integration. Service feature highlights include pre-deployment service planning; WLAN site survey and assessment; WLAN design; and WLAN integration, advanced deployment and optimization.

Once the Aruba wireless network is in place, we will keep it running smoothly by providing the right type and level of ongoing support required to maintain your business critical network. Offerings include Foundation Care, Proactive Care and Data Center Care Services. Learn more at hpe.com/services.

SUMMARY

The transition to the digital workplace requires that the campus network evolve to support the demands of a highly mobile workforce and the anticipated increase in IoT devices. HPE Smart Rate multi-gigabit Ethernet provides the needed bandwidth capacity for constrained wired networks and gives investment protection for IT departments who want to futureproof their network infrastructure as new wireless technologies emerge. Smart Rate technology supports data rates of 1, 2.5, 5 and even 10Gbps with PoE+ power over existing twisted pair wiring and is available on Aruba's integrated wired and wireless portfolio.

TO LEARN MORE

<http://www.arubanetworks.com/products/networking/>