BROADCOM®

SOLUTION GUIDE

Connecting the Gigabit Broadband Infrastructure

Broadband Access Solutions

broadcom.com

The Need for Gigabit Broadband

Global Internet traffic continues to grow by leaps and bounds. By 2020, four billion people will be using the Internet and immersed in a world where 26 billion electronic devices are connected (See Figure 1). The amount of data demanded from these Internet-connected devices will be astronomical. Digital consumers will need faster broadband speeds to access and enjoy rich multimedia web content in real time.

Figure 1. Global IP Traffic & Service Adoption Drivers (Source: Cisco VNI 2016)

	2015	2020
More Internet Users	3.0 Billion	4.1 Billion
More Devices and Connections	16.3 Billion	26.3 Billion
More Video Viewing	70% of Traffic	82% of Traffic

Next generation broadband access networks must be gigabit-capable in order to handle the deluge of Internet traffic and support bandwidth-intensive applications that are essential to the modern digital lifestyle, such as:

- High Definition Video Conference
- 4K/8K Video Streaming
- Real Time Virtual Reality (VR)
- Massively Multiplayer Online Gaming
- Remote Medicine
- Distance Learning
- Cloud Data Access

Key Enabling Broadband Technologies

Getting broadband data to the end consumer requires a robust, high bandwidth infrastructure that reliably delivers data from the core of service provider networks to the access points. By and large, the bottlenecks that inhibit consumers from accessing gigabit broadband services are in the "last mile" links between the operator broadband infrastructure and the customer premise. As depicted in Figure 2, there are several leading technology implementations that enable high data rate broadband in the "last mile." Each implementation has its own technical and cost challenges.

Addressing the "last mile" gigabit challenge entails a number of successful hardware and software implementations across the cable, DSL and fiber infrastructure. Future broadband services will depend on a new set of broadband communication standards from which gigabit speeds are derived.

DOCSIS

DOCSIS 3.1 is the latest cable modem standard enabling operators to deliver gigabit speeds on existing cable networks providing 10Gb/s downstream and 1Gb/s upstream. Next generation Full Duplex DOCSIS (FDX) promises to deliver higher upstream transfer rates up to 10 Gb/s.

DSL

G.fast is the new DSL standard supporting gigabit data rate over short copper wiring. When combined with FTTx PON technology, the hybrid fiber-copper implementation has proven to be substantially more cost-effective for DSL operators to deliver gigabit services to the existing DSL customer base, which is nearly two-thirds of all broadband subscribers. The next generation XG-FAST standard promises to push data rates up to 10 Gb/s, allowing an even greater number of broadband services for DSL subscribers.

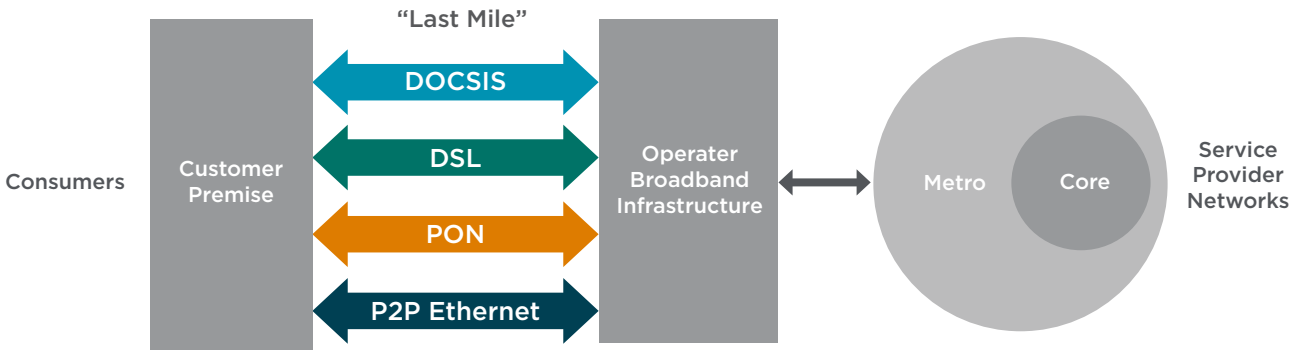
PON

PON is a point-to-multipoint optical communication technology delivering much faster speeds over longer distances compared to traditional copper-based technologies such as DSL and cable. PON continues to be a technology of choice for high bandwidth applications where there are no bottlenecks of copper wiring. Presently there are multiple competing PON systems deployed worldwide. The next generation XGS-PON standard promises to combine various PON technologies into a single, universal 10G PON technology bringing even more capacity, service convergence and operational savings.

P2P Ethernet

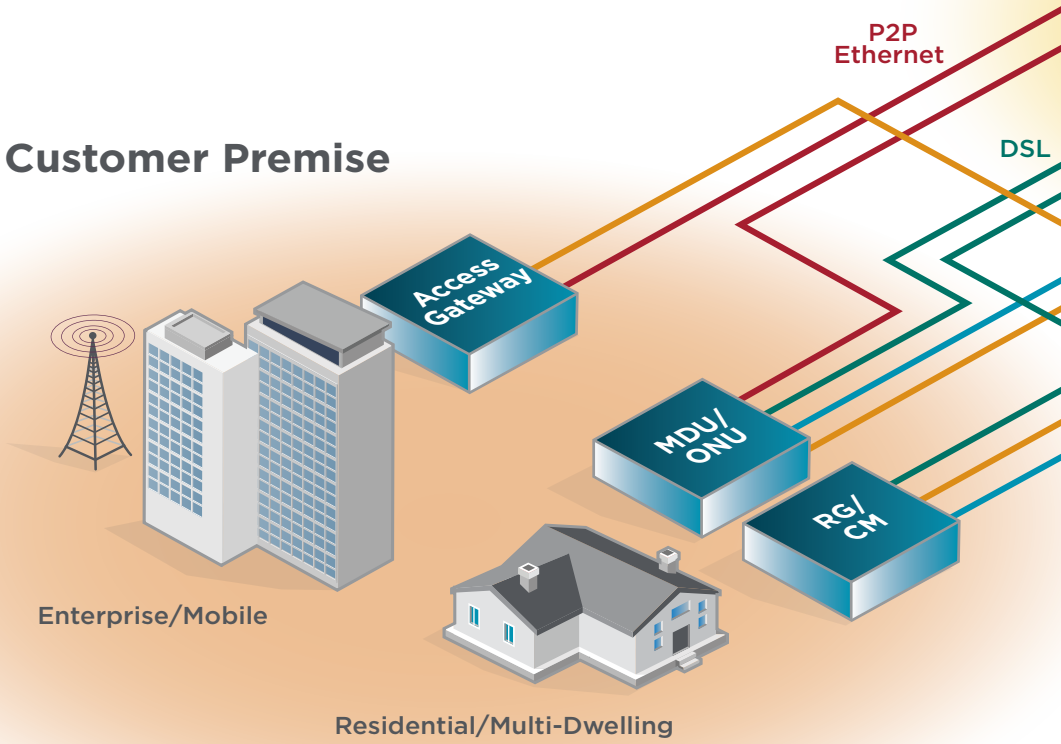
P2P Ethernet over fiber is a point-to-point optical communication technology providing dedicated, non-shared bandwidth to support ultra-broadband applications such as subscriber access and mobile backhaul. Differentiating from point-to-multipoint technologies like PON, P2P Ethernet supports fiber links beyond 10 km while delivering symmetrical multi-gigabit data speeds.

Figure 2. Leading "Last Mile" Technology Implementations



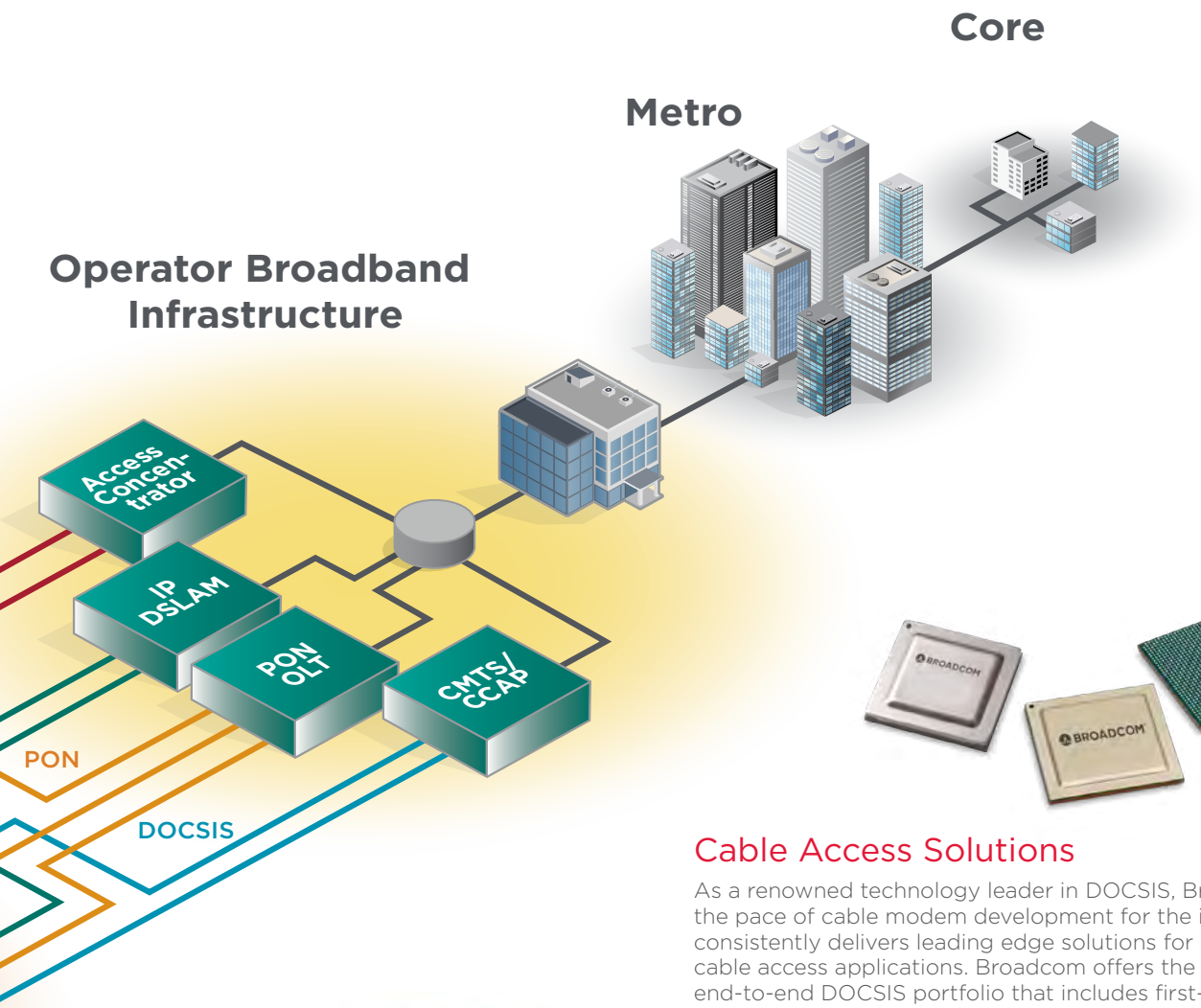
Leading Edge Solutions for Broadband Access

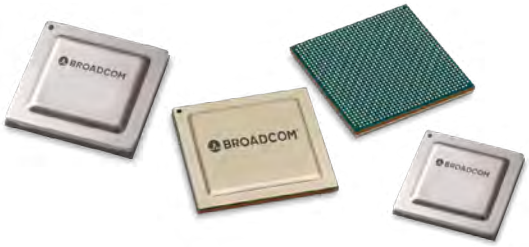
With one of the industry's broadest IP portfolios and extensive product experience in broadband applications, Broadcom offers a comprehensive portfolio of broadband access solutions addressing "last mile" challenges for global service providers. From broadband modem ICs for the customer premise to the CMTS/CCAP, DSLAM and OLT SoC platform solutions for the operator broadband infrastructure, Broadcom's products enable global service providers to deploy next generation broadband access technologies across multiple standards to deliver more bandwidth and faster data speeds to consumers.



DSL Access Solutions

Leveraging two decades of market leadership in xDSL solutions, Broadcom is driving G.fast into the mainstream by uniting it with VDSL/G.vector solutions for advanced DSL infrastructure. Broadcom's end-to-end G.fast portfolio, spanning multi-port G.fast DPU chipsets and highly integrated G.fast gateway SoCs, delivers unmatched density, functionality and power efficiency for the most cost-effective gigabit services on existing DSL infrastructure.





Cable Access Solutions

As a renowned technology leader in DOCSIS, Broadcom sets the pace of cable modem development for the industry and consistently delivers leading edge solutions for broadband cable access applications. Broadcom offers the most complete end-to-end DOCSIS portfolio that includes first-to-market DOCSIS 3.1 CPE modem, CMTS, CCAP, CMC, Remote PHY Device (RPD), and Remote MAC-PHY Device (RMD).

Optical Access Solutions

Broadcom is a leading provider of optical solutions for broadband fixed access, addressing a wide range of applications including point-to-multipoint optical communications (i.e., GPON, EPON) and point-to-point (P2P) optical communications for subscriber access and mobile backhaul. Broadcom offers a complete portfolio of FTTx PON silicon and software that includes the highly integrated PON ONU processor SoC and universal PON OLT platform SoC. In addition, Broadcom provides a wide array of class-leading InP-based lasers and detectors packaged in TO-Can, TOSA and ROSA supporting FTTx PON and long reach P2P optical communications.

Connecting the Gigabit Broadband Infrastructure

Gigabit broadband will be a key cornerstone supporting the data-driven economy of the future. Digital consumers rely more and more on the broadband infrastructure to communicate, learn, interact and entertain in the new digital age. New generations of connected devices and Internet-based services will enter the market with the core assumption that broadband speeds are readily available.

As global service providers embrace new broadband technologies to enable tomorrow's gigabit applications and services, Broadcom continues to innovate and develop leading-edge broadband access solutions, connecting the gigabit broadband infrastructure.

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