# 5G AND NEXT-GEN BROADBAND

*A Symbiotic Relationship*

ADTRAN

# A SMART CONNECTED WORLD

The fifth generation of wireless technology, or 5G as its commonly known, is the next evolution of mobile broadband technology and is one of the cornerstones of a Gigabit Society. Unlike other wireless evolutions that brought incremental improvements in wireless performance, 5G will enable a major societal paradigm shift, powering the Internet of Everything. From connecting billions of Internet of Things (IoT) devices to enabling autonomous vehicles, to enhanced broadband and tactile Internet applications, 5G is the key to the smart connected world of the future.

**1000x**
Higher mobile data volume per geographical area

**<1ms**
End-to-end latency

**10-100x**
More connected devices

**10-100x**
Higher typical user data rate

**5G**
Ubiquitious access including low density areas

**900,000**
More devices per sq. km

**500**
Provides data to device moving up to 500km/hr

**10x**
Lower energy comsumption

# SERVICES-DRIVEN, TRANSFORMATIONAL TECHNOLOGY

5G is a transformational technology that offers both performance and flexibility to support multiple service requirements. 5G promises network connectivity 10 to 100 times faster than 4G networks, with latency of less than 1msec, making possible real-time applications such as mixed reality and autonomous vehicles. In addition, 5G supports massive scale and highly efficient spectral usage to enable billions of connected devices and machine-type communications (MTC) enabling new smart health, agriculture and industrial applications.

# *DENSIFICATION, NEXT-GEN BROADBAND AND SD-ACCESS*

5G involves a new Radio Access Network (RAN) architecture that involves 10 times as many cell sites, known as 5G densification. In turn, each of these hundreds of thousands of cell sites requires multi-gigabit, highly-reliable front-haul, backhaul or cross-haul connectivity network to provide the performance levels necessary to seamlessly deliver bandwidth-intensive applications like mobile video and virtual or augmented reality. Dense, highly scalable fixed broadband access deployments are key to realise the ambitions of 5G.

Next-generation fixed broadband access will provide the substrate over which 5G will be deployed by providing the needed network bandwidth to every new cell site. First and foremost, next-generation Nx10Gbps point-to-multi-point optical fibre networks will be deployed as deeply as possible into the access network. When economics or right-of-way issues persist, Gigabit millimetre-wave (mmWave) fixed wireless and Gigabit–capable copper and coaxial networks will be leveraged to feed new 5G installations.

The industry must extend the SDN/NFV initiatives of the 5G mobile network core across the access network in the form of software-defined access (SD-Access). SD-Access for 5G incorporates open, programmable and scalable broadband access architectures whether deployed over fibre, copper, coax or fixed wireless and will take a leading role in building the converged x-haul networks that will support high-bandwidth and low-latency connectivity.

**10x-100x**
more fibre connections

**4x**
more optical ports/fibre
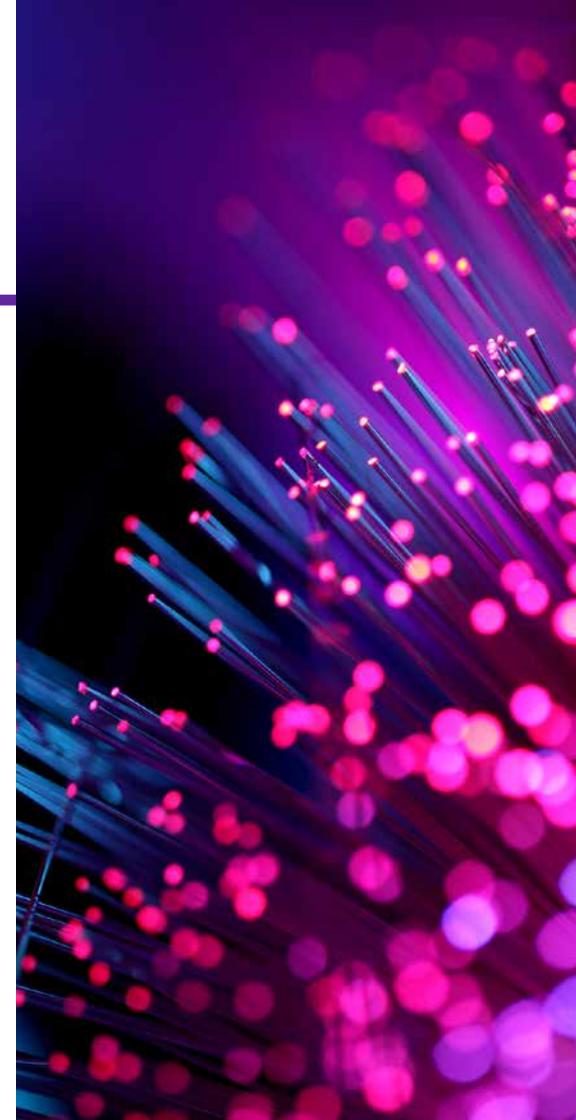
# OPEN, PROGRAMMABLE, SCALABLE NETWORK

Highly programmable SD-Access networks support the adoption of network automation and service orchestration that reduces service provisioning times, human error and IT complexity while enabling customer self-service capabilities. SD-Access is an architectural shift from previous broadband and carrier Ethernet networks that have historically relied on closed, monolithic systems being managed by vendor-specific manage-ment systems. This evolution enables mobile and fixed operators to vastly lower their cost to build, operate, innovate and maintain their network.

# 5G AND NEXT-GEN BROADBAND: A SYMBIOTIC RELATIONSHIP

Addressing the variety of 5G backhaul, crosshaul, and fronthaul applications needed to connect a network of 5G cell sites requires an access network with very-high capacity and low-latency. Emerging 10 Gigabit Passive Optical Network (10G PON) standards provide cost-effective and highly scalable alternatives to traditional point-to-point (P2P) cellular backhaul technologies.

Multi-wavelength NG-PON2 is the infrastructure technology of choice to deliver low-latency, multi-Gigabit services for 5G networks. ADTRAN's demon-stration of non-service impacting wavelength switching in less than 50 milliseconds and sub-20 milli-second latency on NG-PON2, presents a scalable, and highly resilient solution for 5G x-haul needs. NG-PON2 is also one of the foundational elements of SD-Access networks, offering service providers the perfor-mance, programmability, and multi-gigabit capacity required to support small cell 5G densifica-tion initiatives.

# ACCELERATING THE PROMISE OF 5G

PON-based networks are ideally suited for 5G x-haul as they are the most widely deployed fibre access infrastructure worldwide, offering the advantage of both cost and scale. SD-Access-based NG-PON2 allows operators to easily deploy converged residential, business and x-haul services to accelerate the rollout of 5G networks while offering the advantage of the economics and scale of PON networks. In instances where backhaul fibre is initially unavailable or impractical, ADTRAN also offers self-organising mmWave fixed wireless solutions for backhaul and access, as well as Gfast solutions that deliver symmetric Gigabit connections using existing phone (twisted copper pairs) and TV (coaxial) wiring.

Next-gen fixed broadband combined with 5G will define the future network of autonomous cars, tactile internet, massive IoT, and enhanced broadband applications such as 8k video, augmented and virtual reality, and artificial intelligence.

# ADTRAN

**ADTRAN, Inc.**
901 Explorer Boulevard
Huntsville, AL 35806

**General Information**
+1 256 963 8000
www.adtran.com/contactus

**Headquarters—EMEA
ADTRAN GmbH**
Erika-Mann-Str. 25
80636 Munich-Germany
+49 89 411097 111
sales.europe@adtran.com

**Central-/East and
West Europe**
+49 89 411097 111
sales.cewe@adtran.com

**South Europe**
+49 89 411097 111
sales.southeurope@adtran.com

**North Europe and CIS**
+49 89 411097 111
sales.ne@adtran.com

**Middle East and Africa**
+49 89 411097 111
sales.mea@adtran.com

**Asia**
+61 3 9658 0500
sales.asia@adtran.com

**Australia/New Zealand**
+61 3 9658 0500
sales.australia@adtran.com

ADTRAN
Certified
Supplier
ISO 9001
ISO 14001
TL 9000

nsai

TL 9000
TELECOMMUNICATIONS
ISO 9001
QUALITY
ISO 14001
ENVIRONMENT

TL9000
TL19.1270