

Improve 5G Access Performance and Differentiate End-to-End SLAs

Real-time monitoring and AI-enabled analytics enable access providers to step up 5G xHaul performance

Mobile operators are currently upgrading mobile backhaul to support 5G speeds and new low-latency services, as well as increasing cell site capacity to at least 10 Gbps. The access network is at the front end of the customer experience and is one of the most important parts of the mobile network in terms of impact on service quality.

With 5G standalone networks, the Radio Access Network (RAN) will be more distributed, together with small cell densification, and access will be split into fronthaul, midhaul, and backhaul. Multiaccess Edge Computing (MEC) that enables high-bandwidth and ultra-low-latency access to the edge cloud for application developers and content providers will require changes in caching and/or local breakout capability.

These new 5G requirements and stricter end-to-end Service Level Agreements (SLAs) make it critical for Alternative Access Vendors (AAVs) to optimize 5G access performance.



Challenges

- New low-latency 5G service requirements will require AAVs to monitor and deliver more stringent and granular end-to-end SLAs.
- The 5G standalone split access architecture of fronthaul, midhaul, and backhaul will need to be supported and managed.
- AAVs and wireline providers will be required to support MEC edge interconnects, secure cloud gateways, and internet breakouts.

Fiber backhaul usage is expected to grow to just under 40% of global macrocell backhaul links by 2025, according to the GSM Association. AAVs that provide Ethernet backhaul access for 5G will need to support new 5G services at exceptional scale, with high data rates and low latency. Performance monitoring tools must be more precise and accurate to ensure that services are delivered successfully to end customers and can be continually assessed and optimized.

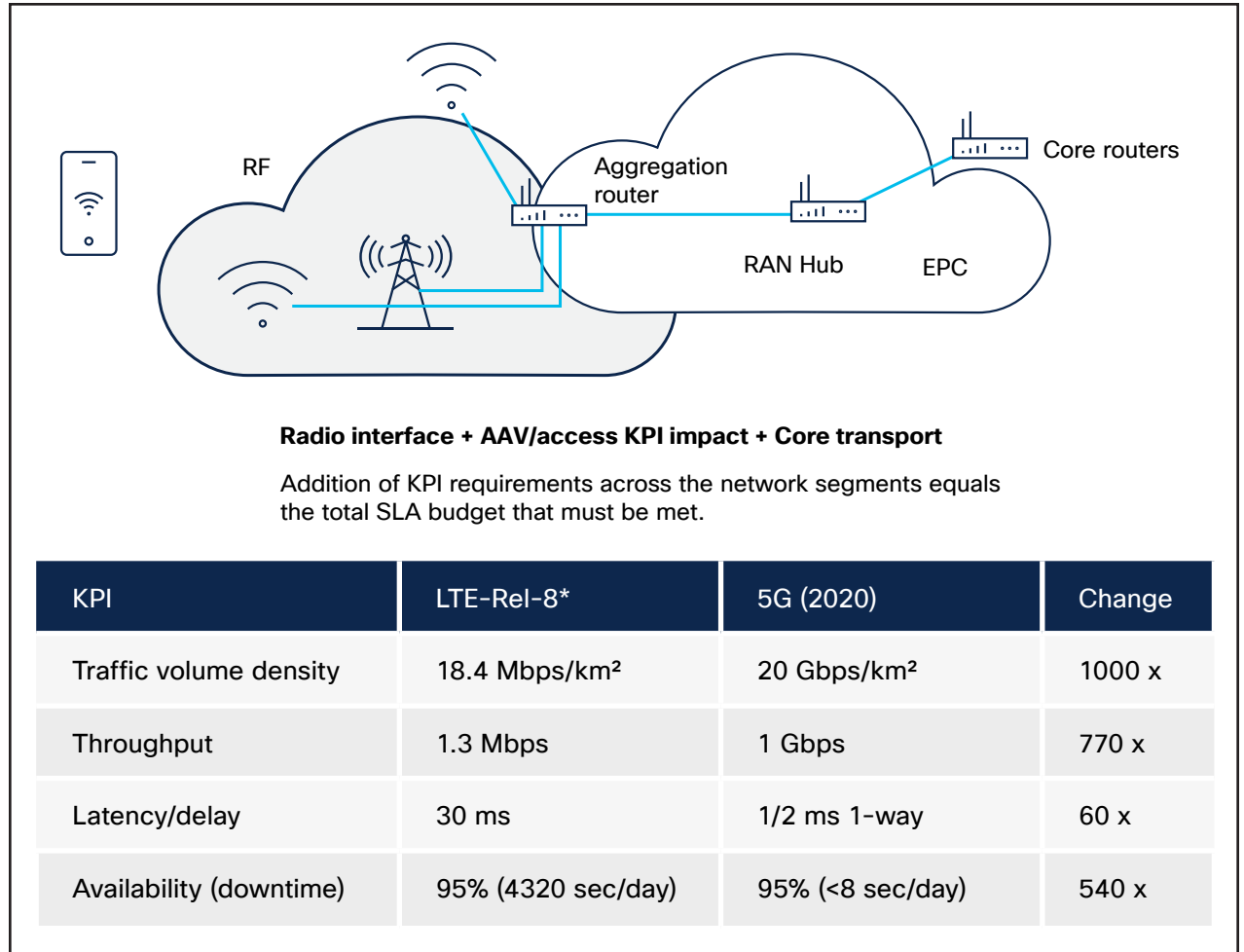


Figure 1. AAV 5G access challenges

Problems originating in the 5G access backhaul can cause latency, jitter, or packet loss that impacts the user experience and satisfaction levels. AAVs need to maintain performance during changing network conditions, as well as support network slicing, edge computing, and other 5G advanced services that will come with 5G standalone networks.

Both 5G mission-critical applications and increased video streaming will result in more stringent, end-to-end latency requirements and impact the backhaul latency budget. For example, an end-to-end latency cap of 10 ms implies a latency across the backhaul that is <1 ms. Access providers need to automate problem resolution and optimize service performance from end to end, plus provide visibility into reporting of Key Performance Indicators (KPIs) and SLA validation.

Solving AAV 5G access challenges with Cisco Provider Connectivity Assurance

The Cisco® Provider Connectivity Assurance (formerly Accedian Skylight) platform offers a multilayered architecture featuring the following key elements: an AI-enabled analytics engine and graphical user interface with built-in sensor management capabilities, a range of sensors in software or hardware form factors, and a data collector for ingestion of model-driven telemetry and other sources of third party performance data. These building blocks help create tailored demarcation solutions for AAVs and a single solution for last mile, edge compute site, small cell, and hybrid access.

A flexible combination of software agents, hardware-assisted components, virtualized functions, and smart Small Form-Factor Pluggable (SFP) hardware make up the lightweight sensor layer. Unique and truly an industry first, 10-Gbps compact SFP devices can be installed at cell sites to enable turn-up testing, bandwidth monitoring, and 24/7 SLA performance monitoring, all on a per-service basis.

A virtualized orchestration layer within the platform centralizes management and orchestration of the sensors, leveraging local controls and REST API automation. It can also feed data into third-party platforms for planning and troubleshooting. Provider Connectivity Assurance software automates the configuration and service provisioning and testing for fast service turn-up.

The platform combines data from all Provider Connectivity Assurance Sensors and third-party sources into a unified view. It offers machine learning-powered alerts and rapid troubleshooting for network and application performance issues. Real-time intelligent monitoring and AI-enabled analytics allow users to predict and automate fixes.

Business benefits

- Improve CapEx/OpEx and SLA management
- Have a single view of service demarcation and KPIs
- Validate that traffic is being treated as per the agreed SLA or class of service
- Detect service degradations before customers are impacted
- Provide clear “proof of innocence” demarcation and segmentation
- Compare, assess, and assure performance to reduce penalties

Space and performance are critical for rolling out 5G’s support infrastructure. There is a very limited choice of compact devices that can provide highly precise SLA monitoring, performance assurance, and demarcation at 1G and 10G speeds in mobile xHaul and small-cell networks. The latency of devices inserted in the data path must be close to zero so that the end-to-end latency of the service is not affected by the introduction of a physical device.

Cisco Provider Connectivity Assurance’s unique high-performance, scalable, and compact 5G-ready hardware devices combine service demarcation with granular, scalable monitoring and performance assurance for 5G services. These devices, such as the Assurance Sensor SFPs, support Layer 2 and 3 services, automated provisioning, testing, and in-service monitoring

protocols. They are based on a flexible Field-Programmable Gate Array (FPGA) architecture optimized for scale and performance that can evolve to meet networking needs.

Provider Connectivity Assurance is capable of ingesting high volumes of performance data in near real time that can help monitor all services and customer SLAs for third-party network providers of Ethernet access and mobile backhaul services. This includes:

- Baselining of performance paths
- Monitoring of change management
- Validation of demarcation services
- Validation of higher speeds and throughputs
- Monitoring of low-latency SLAs for new 5G services

5G access benefits for AAVs

- **Industry-leading performance:** Low-latency service demarcation with zero impact on end-to end service performance
- **Easy deployment:** Automated delivery of new services, activation testing, validation, and performance monitoring
- **Robust and dependable:** Continuous performance monitoring regardless of scale and traffic
- **SLA reporting:** Near-real-time granular (every millisecond) and high-precision performance metrics and KPIs
- **Troubleshooting:** Performance data analytics in real time for proactive monitoring and issue resolution