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Beyond Wi-Fi: Creating smart education  
campuses with pervasive broadband

Private wireless networking for higher education

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Higher-education institutions play a key role in shaping our society and ensuring graduates are ready with the right skills for Industry 4.0. Up to now, these institutions have relied on Wi-Fi networks for campus connectivity and digitalization. But with Wi-Fi reaching its limits of mobility, security and total cost of ownership (TCO), new technologies are emerging.

A private wireless network supported by fixed wireless access (FWA) and optical LAN can meet institutions' connectivity needs — and support a wider set of mission-critical services and operational capabilities.

# The connected education environment

Institutions need fast, secure, high-throughput campus networking to support a wide range of applications including:

**Classroom technologies** such as smart boards, smart podiums and smart lighting so instructors can enhance the learning experience.

**Digital productivity tools** that enable students and staff to get more done while attending classes and practicums and while on the go.

Well-equipped **Industry 4.0 labs** to power research into critical communications technologies and IoT applications.

**Campus security** technologies such as video monitoring, smoke sensors, emergency call buttons and fever detectors to help make campuses safer and ensure student health.

Augmented and virtual reality classrooms to support **remote learning**, enabling students and teachers to participate from anywhere.

High-quality, affordable **residential connectivity** that provides internet access, communications, automation and smart devices for students who live on campus.

**Mobile e-commerce** so students and staff can buy food, event tickets and other merchandise, further supported with autonomous vehicle-based delivery services.



To support these applications, campus networks need to be secure and reliable, with high performance, extensive coverage, high capacity and support for user mobility. Today, 4.9G/LTE private wireless networking is already meeting these needs — and 5G is even more powerful.

# Future-ready performance

A 4.9G/LTE or 5G private wireless network gives higher education institutions everything they need to serve staff and students today and evolve over time.

## Reliability

Cellular networks schedule loads more effectively than Wi-Fi, keeping performance stable and predictable no matter how many users are on the network at once.

## Coverage

Wi-Fi signals have trouble getting around obstructions including buildings, trees, large vehicles and metal fences — making it difficult to achieve full coverage of a large complex like a university campus. With higher-power, lower-frequency radio signals that can travel farther, 4.9G and 5G generate broad coverage.

## Capacity

4.9G/5G's advanced scheduling capabilities mean each small cell can handle hundreds of users actively communicating at once — while Wi-Fi access points often struggle to handle more than 50.

## Mobility

Wi-Fi was never designed for mobility and doesn't manage it well, with slow handoffs between access points that make true mobility impossible. LTE/5G are built to ensure seamless coverage no matter how far or how fast users and their devices travel.

## Performance

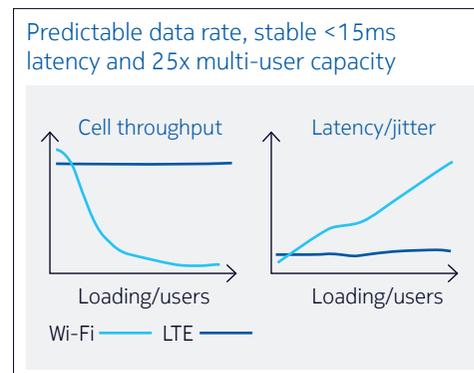
Unlike Wi-Fi, LTE/5G performance does not degrade with the number of connected users or devices. Combined with a decreased vulnerability to interference, this means private wireless produces much better, more reliable performance.

## Security

Wi-Fi's vulnerability to hacking has made many institutions hesitant to adopt other kinds of wireless solutions, but private wireless offers end-to-end encryption and military-grade security to keep operations and sensitive data safe.

## Lower TCO

A private wireless network has an overall lower long-term cost of ownership than Wi-Fi: the larger coverage area reduces the initial capex, and the network's much higher capacity eliminates many of the costs that would come with scaling up the access points.



## The power of fiber

For situations that demand high-capacity wired connections, passive optical LAN (POL) uses optical fiber to deliver high-bandwidth connectivity where you need it — providing better service than traditional copper cabling at a much lower cost.

## Going farther with FWA

Fixed wireless access (FWA) extends the reach of private wireless networks to remote buildings or student residences.



Having a single private wireless network to handle all loads and applications is easier to manage — with better performance, stronger security and greater flexibility.

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As a trusted partner for critical networks, we are committed to innovation and technology leadership across mobile, fixed and cloud networks. We create value with intellectual property and long-term research, led by the award-winning Nokia Bell Labs.

Adhering to the highest standards of integrity and security, we help build the capabilities needed for a more productive, sustainable and inclusive world.

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