

MANAGED CAMPUS INFRASTRUCTURE

HOSTAXIS NETWORK PVT LTD

Enterprise Wi-Fi 7 College Campus Network Architecture

High-density multi-vendor wireless design combining Ubiquiti UniFi & TP-Link Omada Wi-Fi 7 APs, MikroTik core routing, Sophos perimeter firewall, and RADIUS 802.1X identity management.



Hostaxis Network Pvt Ltd



www.hostaxis.in



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Tri-Band 6 GHz MLO



Hostaxis Network Pvt Ltd – Campus Solution Provider

A **Campus Wi-Fi Network** is an enterprise-grade, high-density wireless infrastructure designed to provide seamless, secure, and ultra-fast internet and intranet connectivity across an entire educational institution—including classrooms, lecture halls, central libraries, student hostels, administrative blocks, and outdoor campus quads.

Next-Gen Wi-Fi 7 (802.11be) Standard: Utilizes ultra-wide 320 MHz channels, 4096-QAM modulation, and Multi-Link Operation (MLO) to deliver multi-gigabit speeds (up to 46 Gbps) with sub-2ms deterministic latency.

High-Density Client Handling: Engineered to manage 3,000+ simultaneous student and staff devices in congested areas like auditoriums and libraries without spectrum saturation.

AI-Driven RF & Spectrum Optimization: Employs automated channel selection, power auto-tuning, and 6 GHz band offloading to mitigate co-channel interference from personal hotspots or rogue APs.

Zero-Trust Security & Dynamic VLANs: Features WPA3-Enterprise encryption, 802.1X user authentication, and automated VLAN assignment separating staff, students, infrastructure, and visitors.

Regulatory & Legal Compliance: Fully compliant with Indian DoT and CERT-In guidelines, featuring 1-year NTP-synchronized IPDR log retention, NAT translation tracking, and secure visitor captive portals with SMS OTP verification.

Resilient Infrastructure: Built on a 10G optical fiber backbone connecting floor-wise IDF switches to a centralized high-availability core (MikroTik and Sophos firewall clusters) backed by 24/7 NOC monitoring.

SERVICE PROVIDER & SYSTEM INTEGRATOR

Hostaxis Network Pvt Ltd – Campus Solution Provider



Hostaxis Network Pvt Ltd

Enterprise Connectivity & Managed Campus Infrastructure

Patna, Bihar, India • Official Web Portal: www.hostaxis.in



Campus Wireless & Fiber

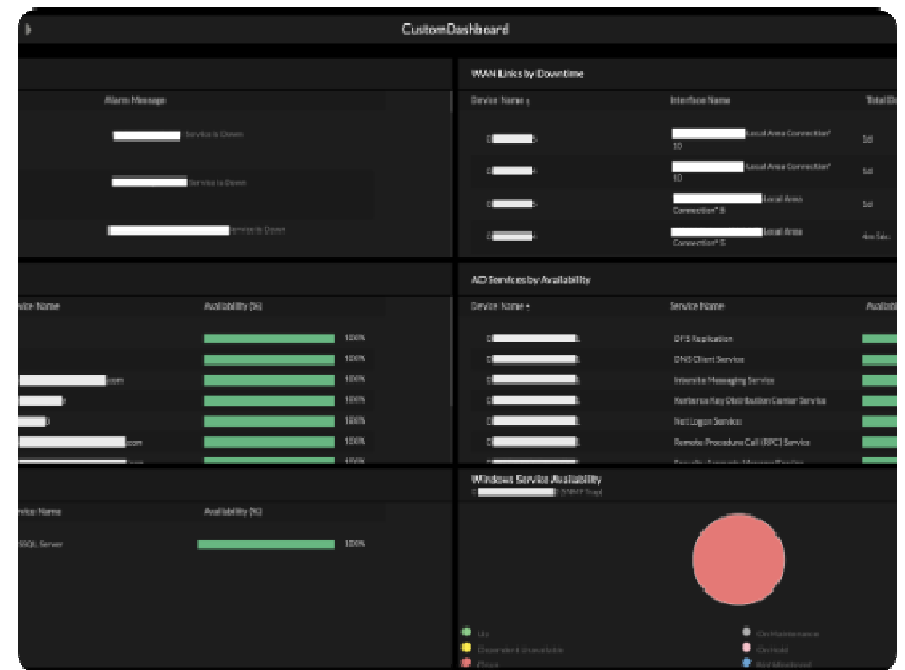
High-capacity optical fiber broadband and turnkey Wi-Fi campus deployment.



Server Colocation & NOC

Patna carrier-neutral data center facility with 24/7 managed NOC support.

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College Campus Wi-Fi Overview & Key Operational Issues

1. High-Density Client Congestion

3,000+ simultaneous devices in auditoriums, libraries, and hostels causing spectrum saturation.

2. Architectural Signal Attenuation

Thick concrete hostel walls and RCC lab structures leading to severe indoor Wi-Fi dead zones.

3. Unsanctioned Rogue APs & Hotspots

Personal student routers and mobile hotspots creating heavy co-channel RF interference.



Indian Govt (DoT / CERT-In) Compliance & Logging Guidelines

Regulatory Mandate	Technical Implementation Standard
CERT-In 1-Year Log Retention	Syslog server stores NTP-synchronized IPDR (IP Detail Record), NAT translation, and DHCP lease logs for 365 days.
DoT KYC & Traceability	Strict identity mapping pairing student roll numbers / mobile OTP with static MAC address via RADIUS authentication.
Legal Intercept Readiness	Sophos Firewall deep packet inspection with user-specific traffic mirror port capability for law enforcement compliance.
Visitor Guest Auditing	Mandatory SMS OTP verification on captive portal storing visitor mobile numbers with timestamped session logs.

Full compliance with Indian Information Technology Rules & DoT Wi-Fi Public Hotspot Guidelines.

6 Types of Security Audits



Building Room Coverage & MDF/IDF Server Topography



Hostel In-Wall Wi-Fi 7 APs

Flush wall-plate APs per room with PoE passthrough and 4 Gigabit RJ45 ports for student study desks.



Building IDF Floor Racks

Floor-wise 24/48-port Managed PoE+ switches linked via 10G SFP+ single-mode fiber to central MDF.

Central MDF Server Room Topography

1. Edge Core: MikroTik CCR2004 Core Router + Sophos XGS HA Firewall Cluster.

2. Identity Server: FreeRADIUS Server + Active Directory / LDAP Database.

3. Syslog Appliance: Dedicated 12TB Storage Server for CERT-In IPDR Logs.



Wi-Fi 6 (802.11ax) vs Wi-Fi 7 (802.11be) Architectural Standard

Feature Specification	Wi-Fi 6 / 6E (802.11ax)	Wi-Fi 7 (802.11be) – Deployed Standard
Operating Frequency	2.4 GHz & 5 GHz (6 GHz on 6E)	Tri-Band 2.4 GHz, 5 GHz & 6 GHz Native
Maximum Channel Width	160 MHz Channel Width	320 MHz Ultra-Wide Channels (2x Throughput)
Modulation Density	1024-QAM Modulation	4096-QAM (4K QAM – 20% Peak Data Rate Boost)
Multi-Band Connectivity	Single-Band Session Switch	Multi-Link Operation (MLO Concurrent Aggregation)
Target Latency & Rate	Up to 9.6 Gbps (~10-20ms)	Up to 46 Gbps (<2ms Deterministic Real-time Latency)

Ubiquiti UniFi & TP-Link Omada Wi-Fi 7 Access Points

Ubiquiti UniFi Wi-Fi 7 UniFi U7-Pro / Max

2.5G Multi-Gigabit Ethernet uplink with 6 GHz 2x2 MU-MIMO antenna matrix.

Deployment Focus:

Administrative blocks, executive boardrooms, and outdoor campus quads.

Centralized Management: UniFi Cloud Gateway

TP-Link Omada Wi-Fi 7 Omada EAP770 / 720

Tri-Band BE11000 speeds powered by PoE+ 802.3at energy standard.

Deployment Focus:

High-density lecture halls, central library auditoriums, and dormitories.

Centralized Management: Omada OC300 Controller



MikroTik Core Router & Sophos Firewall Integration

Sophos XGS Next-Gen Firewall

Deep packet inspection, TLS 1.3 decryption, and automated threat containment.

MikroTik CCR2116 Core Router

Inter-VLAN wirespeed routing with hardware FastPath acceleration.

Campus VLAN Segmentation Matrix

VLAN ID	Segment Name	Subnet	Security Policy
VLAN 10	Management / Infra	10.10.0.0/24	Strict Admin Access
VLAN 20	Faculty & Staff	10.20.0.0/21	802.1X / Full Intranet
VLAN 30	Student Wireless	10.30.0.0/19	802.1X / Peer Isolation
VLAN 40	Visitor / Guest	10.40.0.0/20	Captive Portal / Internet Only



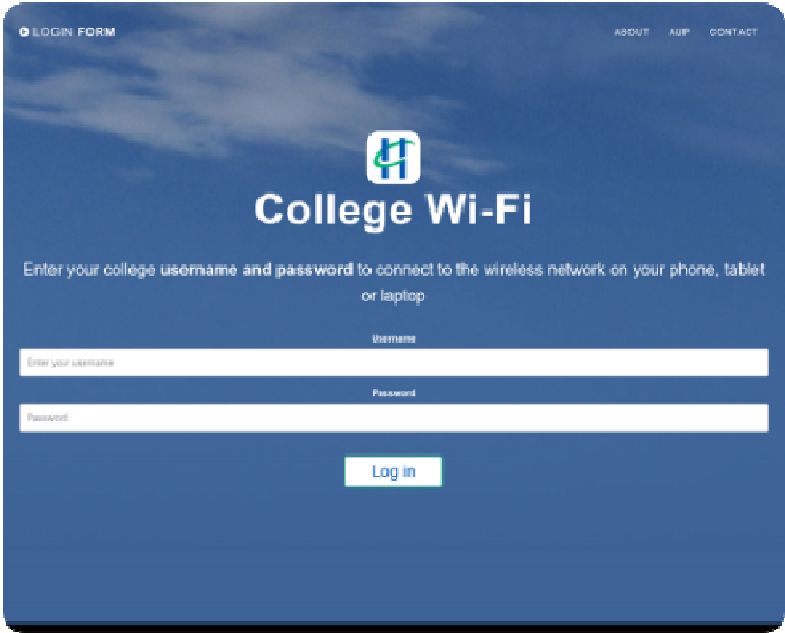
Enterprise RADIUS (802.1X) & Visitor Captive Portal

PATH A Staff & Student 802.1X Auth Flow

- 1. Connect SSID**
EAP-TLS / PEAP-MSCHAPv2 secure negotiation.
- 2. FreeRADIUS Check**
Active Directory & LDAP database query.
- 3. Dynamic VLAN**
RADIUS assigns VLAN 20 or 30 automatically.

PATH B Visitor Captive Portal Access

- 1. Open Portal**
Automatic HTTP redirection to landing page.
- 2. OTP Validation**
SMS / Email verification or sponsor pass.
- 3. VLAN 40 Rate Limit**
Filtered web access with peer isolation.



Managing Wi-Fi Channel Congestion via Omada SDN

Solution: AI 6 GHz Band Offloading



2.4/5 GHz Spectrum Interference

Co-channel interference caused by dense student smartphones and laptops.

Feature: Automatic RF Heatmaps



Omada SDN AI Optimization

Dynamic channel selection, power auto-tuning, and seamless 802.11k/v/r roaming.

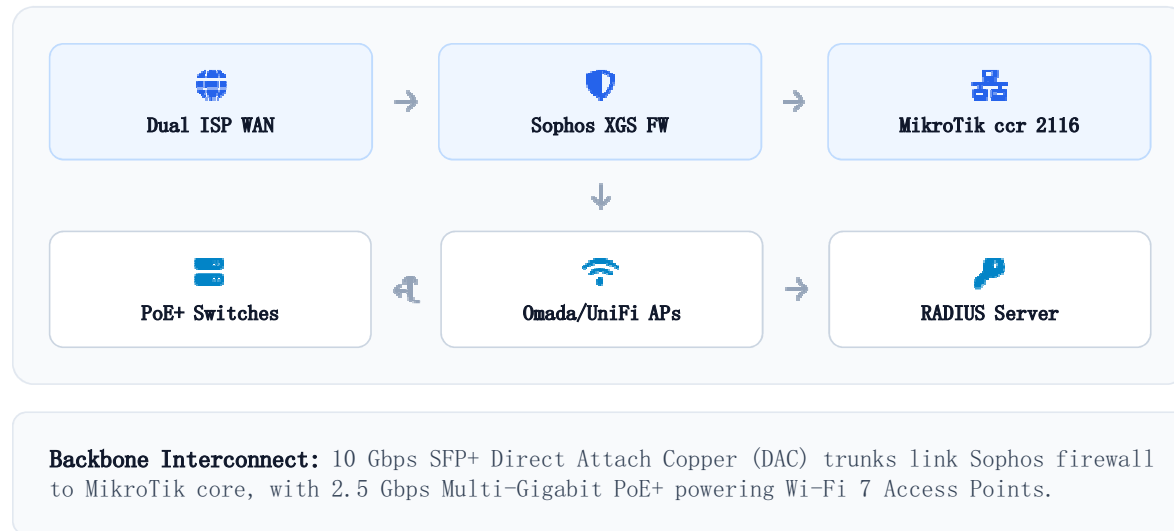
Standard: Zero-Trust Campus



Enterprise Wireless Security

WPA3-Enterprise encryption, Rogue AP mitigation, and WIPS threat isolation.

Physical Device Interconnect & Topology Layout



Network Maintenance, Monitoring & Support Framework

24/7 NOC Cloud Monitoring by Hostaxis

Centralized telemetry across Omada SDN & UniFi Site Manager with active threat alerts.

Firmware Patch Lifecycle

Automated rolling updates during off-peak night windows to eliminate downtime.

4-Hour On-Site Hardware SLA

Rapid spare replacement protocol with High-Availability router failover.

SERVER RACK SIZES & DIMENSIONS GUIDE

Choose the right rack size based on equipment, cooling, space, and future growth.



HEIGHT (U)
12U to 48U



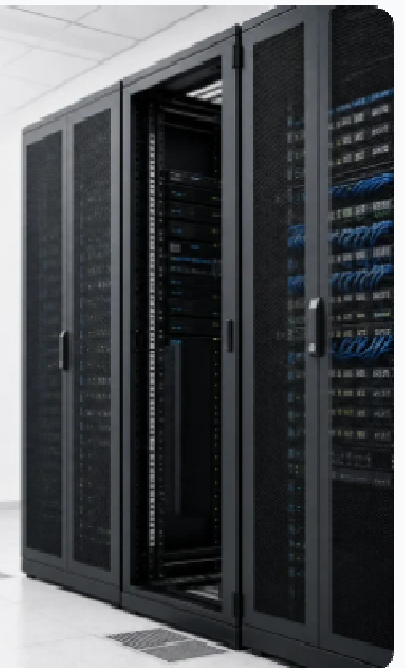
WIDTH
19 INCH



DEPTH
24" to 48"



RIGHT SIZE. BETTER PERFORMANCE.
Plan for today. Prepare for tomorrow.



SYSTEM CAPACITY & DEPLOYMENT SUMMARY

Campus Network Deployment Overview

10 Gbps

Fiber Core Backbone

300+

UniFi & Omada APs

8,000+

Concurrent Clients

99.99%

Uptime SLA Design
