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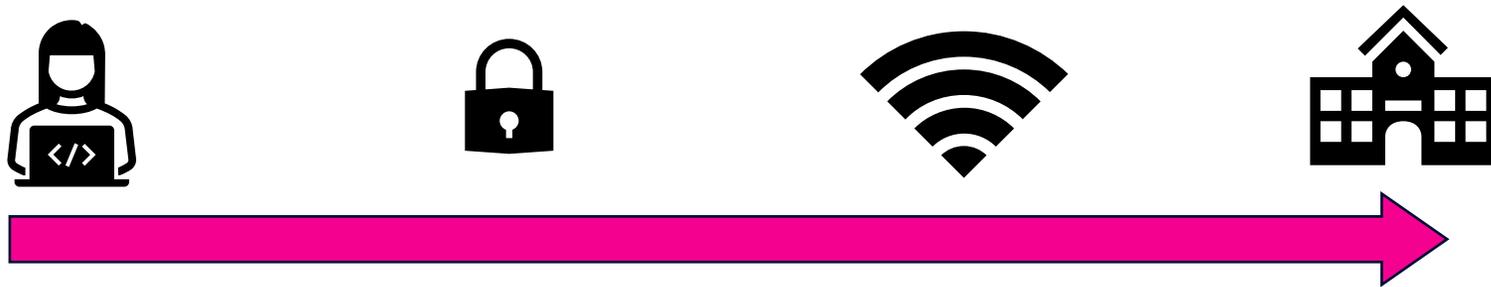
# Soluzioni Cloud Wi-Fi nell'infrastruttura di campus

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# Il problema dell'accesso in unimi

- 2020-2023: estensione delle reti wi-fi in ateneo
- Obiettivi 2023/2024:
  - Promuovere l'accesso sicuro ai servizi sulle reti wi-fi istituzionali
  - Evitare bypass su reti LTE personali
  - Qualità dell'esperienza di connettività



# Per la qualità del wi-fi in unimi

- **Metodi**

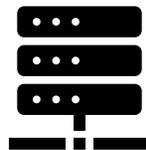
- Progettazione professionale delle WLAN (GARR Workshop 2022)
- Analisi dell'utente/dispositivo finale
- Proattività nella gestione e supporto

- **Tecnologie**

- Legacy Wi-fi: controller-based, focus sull'infrastruttura
  - In graduale migrazione verso il cloud
- Cloud Wi-Fi: architettura distribuita, focus sull'utente finale

- **Attualmente due tecnologie cloud in produzione**

- Juniper Mist
- Extreme Networks



# Cloud Wi-Fi: definizioni

- Un concetto maturo:
  - 2006: Aerohive, Meraki
  - 2012: Cisco > Meraki
  - 2014: Mist Systems
  - 2019: Extreme > Aerohive, Juniper > Mist
- Architettura distribuita
  - Management plane
    - Public cloud
    - Private cloud
    - Cloud on-premises
  - Control plane
    - Cluster di AP
- Conformità normativa: GDPR, ISO27001
- Machine Learning / Artificial Intelligence
- API e automazione



Cloud Management:  
Config, monitoring, ML/AI



Distributed Control



Client devices

# Cloud Wi-Fi: caratteristiche

- Nessun wireless controller
  - Niente aggiornamenti firmware, banchi, generazioni tecnologiche incompatibili
  - Non più silos di dati e telemetria isolati nel WLC
  - Priming e discovery semplificati
- Evoluzione continua delle funzionalità (release) in cloud
- Messa a fattor comune di dati e telemetria (!)
  - ML/AI
  - Device fingerprinting
- Scalabilità
  - Deployment semplificati
  - Zero-touch provisioning
- Gestione unificata delle informazioni

# Network 360° Monitor

The dashboard displays the following metrics:

Metric	Value	Status
DEVICES	93 / 100	EXCELLENT
CLIENTS	75 / 100	GOOD
WIFI	100 / 100	EXCELLENT
NETWORK	100 / 100	EXCELLENT
SERVICES	100 / 100	EXCELLENT
APPLICATIONS (TOTAL APP USAGE)	8.2 GB	
SECURITY (TOTAL ROGUES)	0	

The map view shows a network topology with a central hub and several connected nodes. The map includes a search bar, a list of locations, and a 'Device Trail Over Time' section. The current view is 'Device View' with 'Connected Clients' selected. The map shows a red circle with the number '9' near the 'Università Degli Studi Di Milano' location.



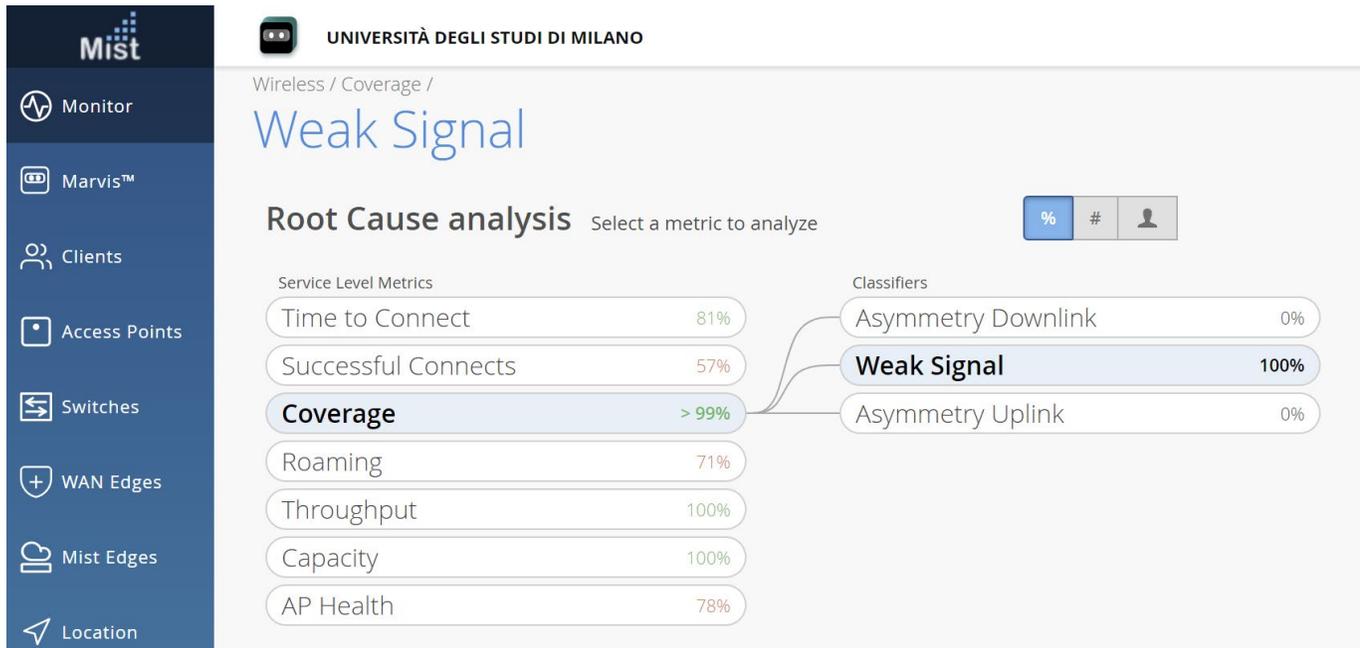
# Marvis troubleshooting

The screenshot shows the Mist Marvis interface for troubleshooting a site named 'Celoria18'. The interface includes a sidebar with navigation options like Monitor, Marvis™, Clients, Access Points, Switches, WAN Edges, Mist Edges, Location, Analytics, Site, and Organization. The main content area displays the search results for 'Celoria18' and shows a query results section with a feedback prompt: 'How would you rate my response?' with a 5-star rating and a 'TELL ME MORE' link. Below this, there are four filter buttons: 'Assoc/Auth' (with an exclamation mark), 'DHCP/DNS' (with a checkmark), 'AP' (with a minus sign), and 'RF' (with a checkmark). The main message states: 'We found 3 service level problems affecting this site'. The first problem is 'AP Health', described as: 'Access Points in the site were healthy 78% of the time. Most of the failures occurred on the "dipinfo-266" access point. Most of the failures strongly correlate with the celoria18-p1-rackH switch.' A 'CLOSE' button is visible next to this problem. Below the text, there is a 'Service Levels' section with a sub-section 'AP HEALTH' showing '330 incidents Total'. At the bottom, there is a line chart titled 'AP HEALTH' showing the percentage of AP Health over time, with a legend indicating 'AP Health'.



# Campi di applicazione

- Storicamente: gestione dell'infrastruttura (AP):
  - Soluzione di problemi complessi RF:
    - Piano e larghezza canali
    - Tx Power
    - Interferenze e recovery
    - Coverage holes

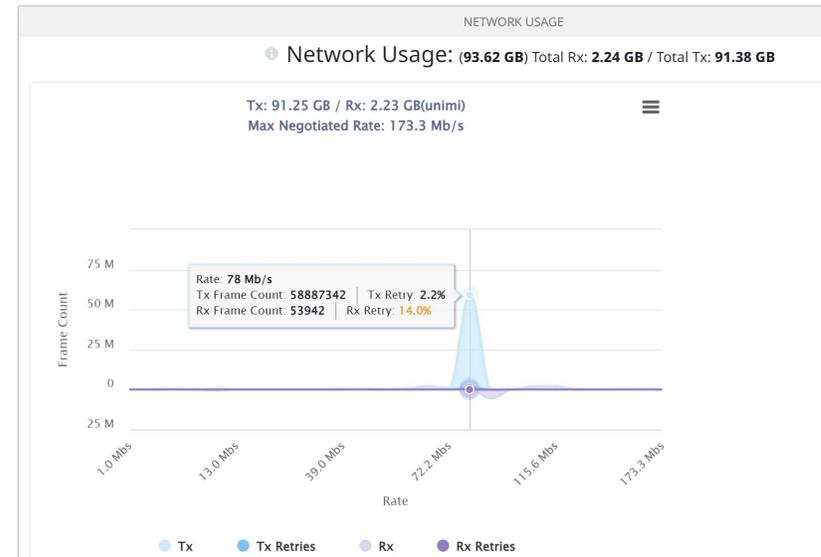
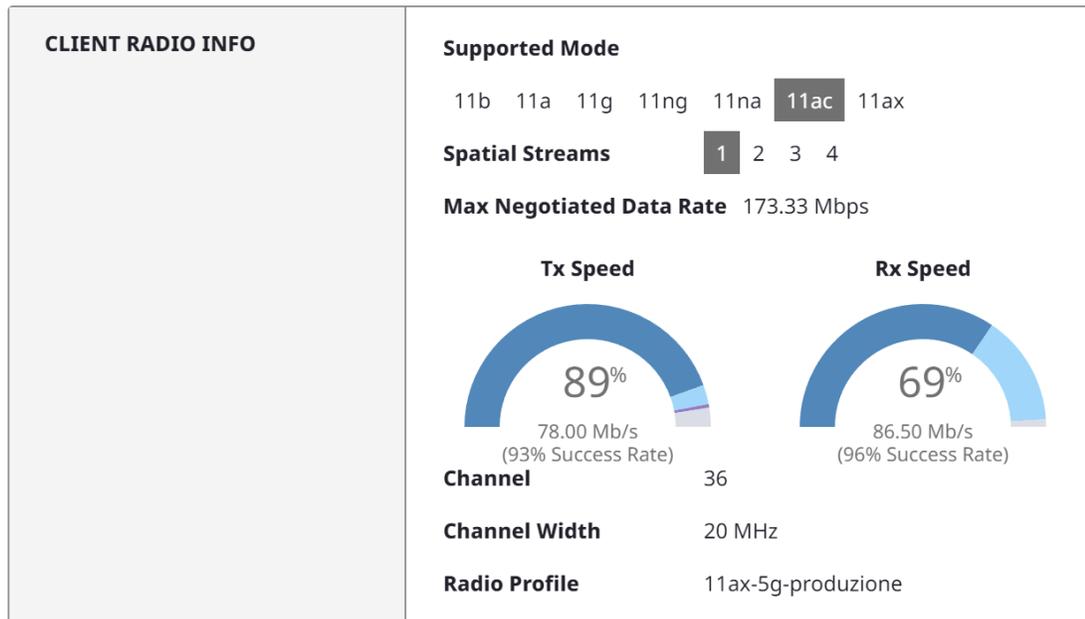


The screenshot shows the '6 GHz Settings' configuration page. The 'Band Enabled' section has 'Enabled' selected. The 'Channel Width' is set to '40 MHz'. The 'Radio Resource Management' section has 'Power' set to 'Automatic' with 'min (dBm)' at 14 and 'max (dBm)' at 17. The 'Channels' section has 'Automatic' selected. The 'External Antenna Gain' is set to '0 dBi'.

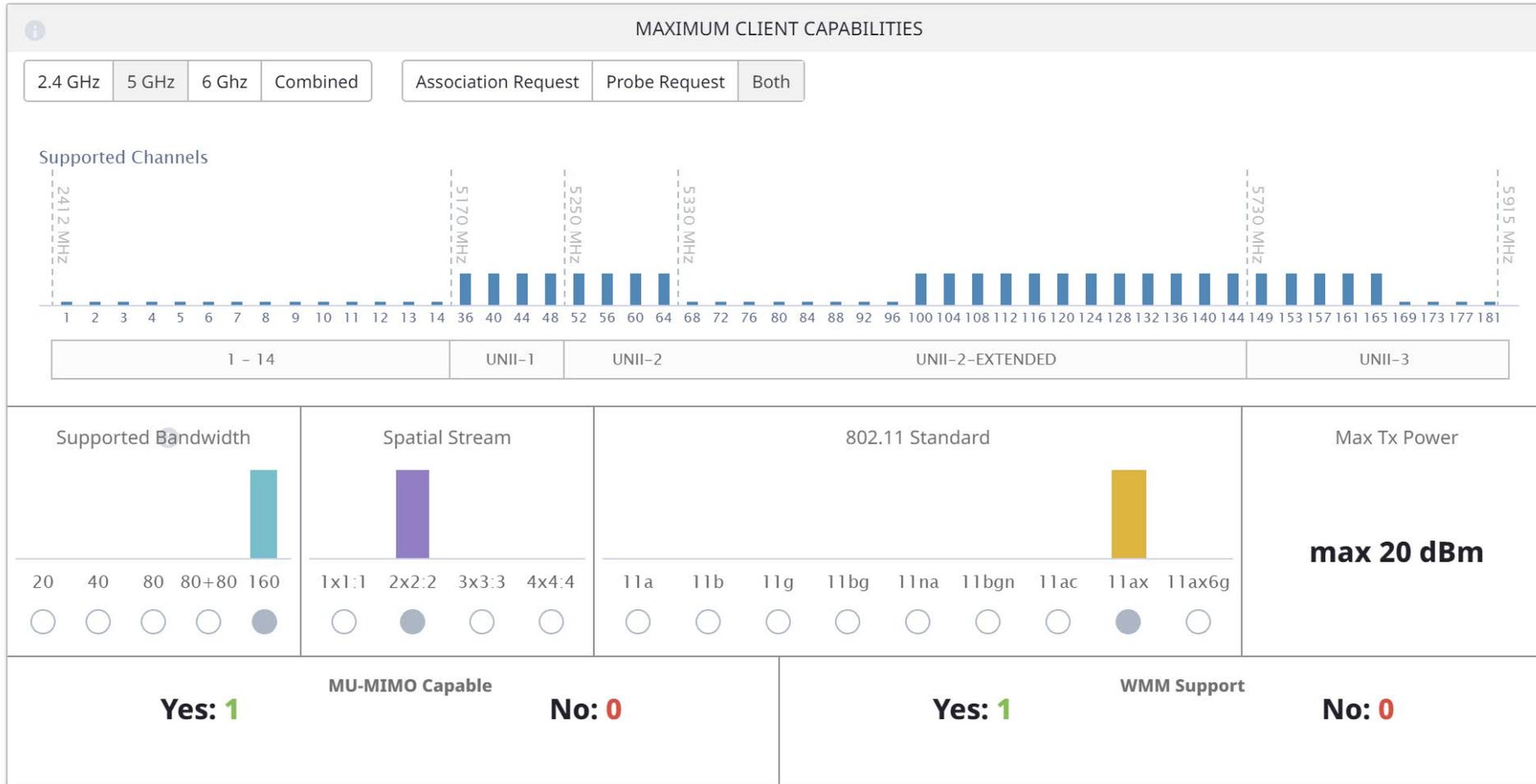


# Cambio di prospettiva

- Focus sui dispositivi e sugli utenti:
  - Capabilities, discovery, association
  - Autenticazione
  - RSSI, data rates, retries
  - Roaming



# Device Profiler



# Ritorno all'infrastruttura: non è colpa del wi-fi!

- Analisi dell'infrastruttura a supporto della WLAN

- RADIUS
- DHCP
- DNS

## Client Events

44 Total 30 Good 1 Neutral **13 Bad**

DNS Failure	dipinfo-228	7:11:39.195 PM Nov 5, 2023
DNS Failure	dipinfo-228	7:06:03.008 PM Nov 5, 2023
DNS Failure	dipinfo-228	6:58:11.103 PM Nov 5, 2023
DNS Failure	dipinfo-228	6:58:11.036 PM Nov 5, 2023
DNS Failure	dipinfo-228	11:06:25.464 AM Nov 5, 2023
DNS Failure	dipinfo-228	8:38:21.905 AM Nov 5, 2023

AP	dipinfo-228	Client IP Address	172.29.128.97
BSSID	a8:3a:79:91:1d:91	SSID	eduroam
VLAN	652	Band	5 GHz
DNS Servers	10.3.5.101	Description	Failing DNS query from 172.29.128.97 to 10.3.5.101 for "spclient.wg.spotify.com"
Count	1		

# Ruoli e deleghe per helpdesk e tecnici locali

The screenshot displays the 'ExtremeCloud IQ Pilot' interface. On the left is a navigation sidebar with icons for various features. The main content area is divided into three sections: '3rd Party API Connections', 'CHOOSE ROLE', and 'ASSIGN LOCATION'. The 'CHOOSE ROLE' section shows a list of predefined admin roles: Administrator, Operator, Monitor, Help Desk (selected), and Guest Management. The 'Help Desk' role is highlighted with a blue background and includes a description: 'Help Desk role provides full access to the Troubleshoot tab and search access to the User 360 View and Client 360 View.' The 'ASSIGN LOCATION' section shows a search bar and a list of locations: unimi, DirICT (checked), Rudini9, San Donato, Stephenson, and TelelavoroTest.

ExtremeCloud IQ Pilot

3rd Party API Connections

Alert Notifications **BETA**

Webhooks

Emails

User Subscriptions

LOGS

Audit Logs

GDPR Audit Log

KDDR Logs

Authentication Logs

Accounting Logs

Credential Logs

Email Logs

SMS Logs

CHOOSE ROLE

1 Select a role from the predefined admin roles

Administrator

Operator

Monitor

Help Desk

- Help Desk role provides full access to the Troubleshoot tab and search access to the User 360 View and Client 360 View.

Guest Management

ASSIGN LOCATION

2 Select a location to which the admin will have access.

Search Category

unimi

-  DirICT

-  Rudini9

-  San Donato

-  Stephenson

-  TelelavoroTest

# Ruoli e deleghe per installatori

**Mist** UNIVERSITÀ DEGLI STUDI DI MILANO

< Administrators : **New Invitation**

Email Address is required

Email Address required

First Name required

Last Name required

### Administrator Roles

- Super User  
Full access to all sites, able to create new sites and manage other administrators
- Network Admin  
Full access to selected sites
- Observer  
Monitor only access to selected sites
- Installer**  
Access limited to installing APs and Switches
- Helpdesk  
Helpdesk monitoring and workflow for selected sites

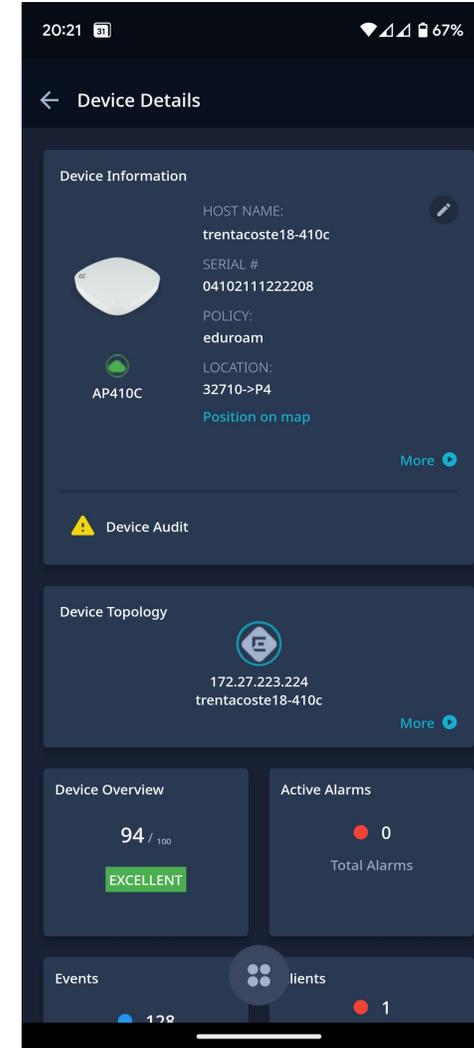
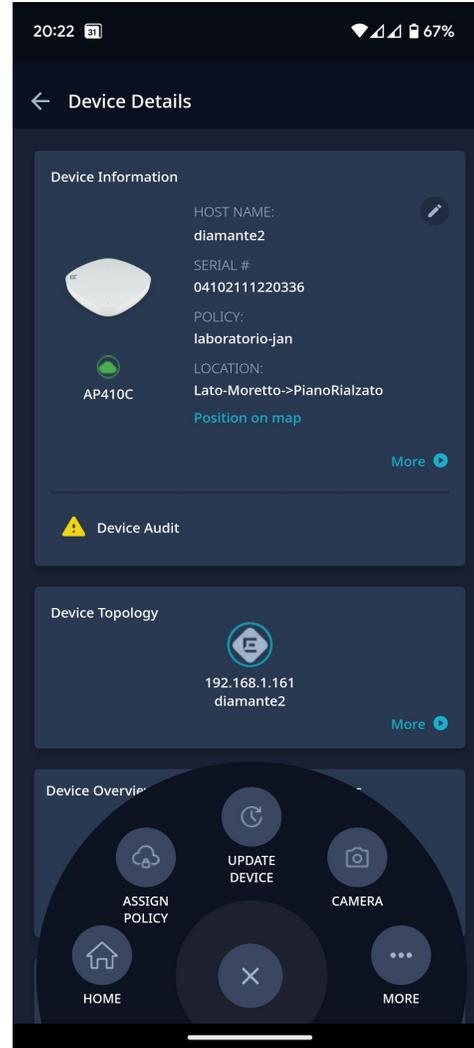
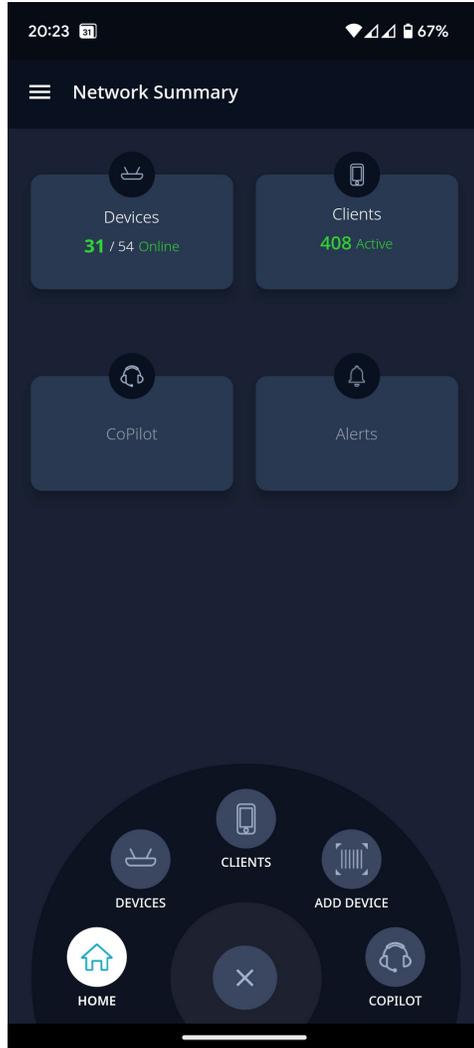
### Limited Roles

- Switch Port Operator ⓘ  
Can view and manage switch port configurations that are allowed by a Super User

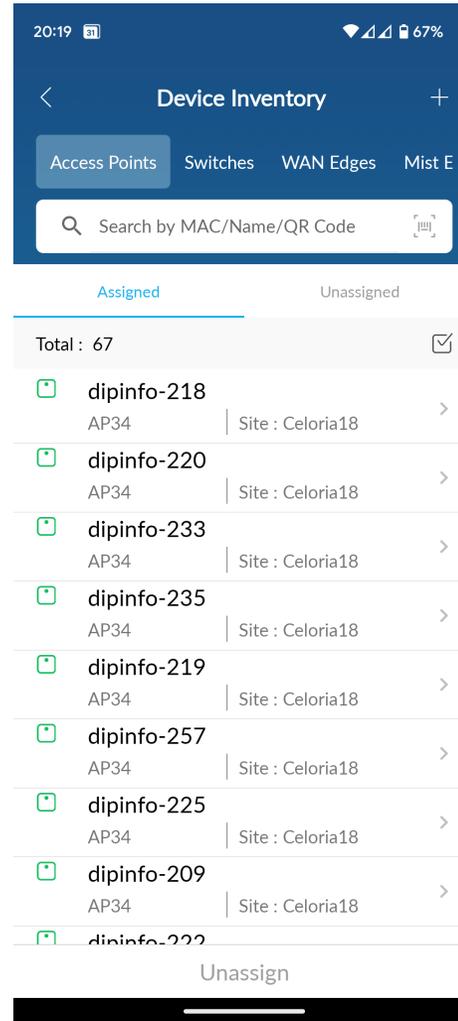
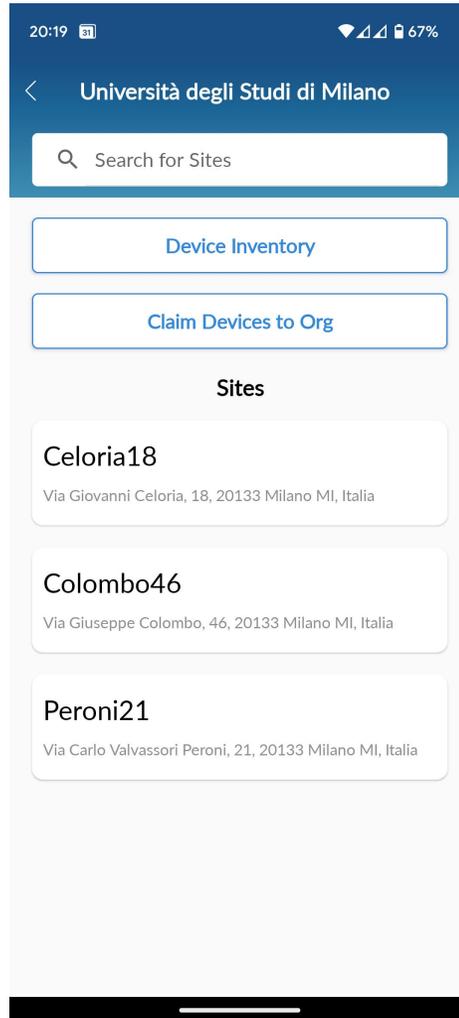
### Site Access

All Sites | Site Groups | Specific Sites

# App Android/iOS



# App Android/iOS



# Troubleshooting avanzato: packet capture sull'AP

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2023

**WPA2 e WPA3:  
dispositivi,  
transizioni e  
prove sul campo**

**Jan Reister**  
Università di Milano

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**Roma**  
**7 novembre 2023**



# Criticità

- Licenze, licenze, licenze
  - Spostamento dal modello CAPEX a OPEX
  - Licenze granulari per funzionalità
- Soluzione del problema Layer 2
  - Gli AP sono terminati localmente sullo switch
  - Esigenza di centralizzazione del traffico
  - Soluzioni di Tunneling / Fabric
- Abbandono di SNMP e CLI in favore di API
  - Acquisire nuove competenze
  - Nuovi metodi di monitoraggio
  - Automazione



# Punti aperti

- Stiamo regalando a terzi i dati del nostro traffico?
  - Sono anni che ci affidiamo a fornitori Enterprise
  - È complesso/oneroso utilizzare i dati locali in modo efficace
  - Che valore ha ciò che otteniamo in cambio?
- AI/ML sostituiranno il mio lavoro?
  - Fine dei compiti ripetitivi per correlare informazioni
  - Fare di più con meno risorse!
- Come verificare la correttezza di AI/ML?
  - Tornando sul campo, visitando i nostri siti, finalmente
  - Parlando con le persone
  - Usando i nostri strumenti di analisi professionale
  - Confrontandoci con la comunità

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Domande?



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