facebook connectivity

magma

Magma Overview

Name

Title

Network Performance is **At Risk**

3.3 billion people in **developing** and **emerging** markets are at risk of degraded network performance by 2023

Source: Facebook Connectivity Internal Research 2019
Connectivity measurements exclude China

Why Facebook And Connectivity?

Connectivity is good for industries and companies of all kinds - including Facebook

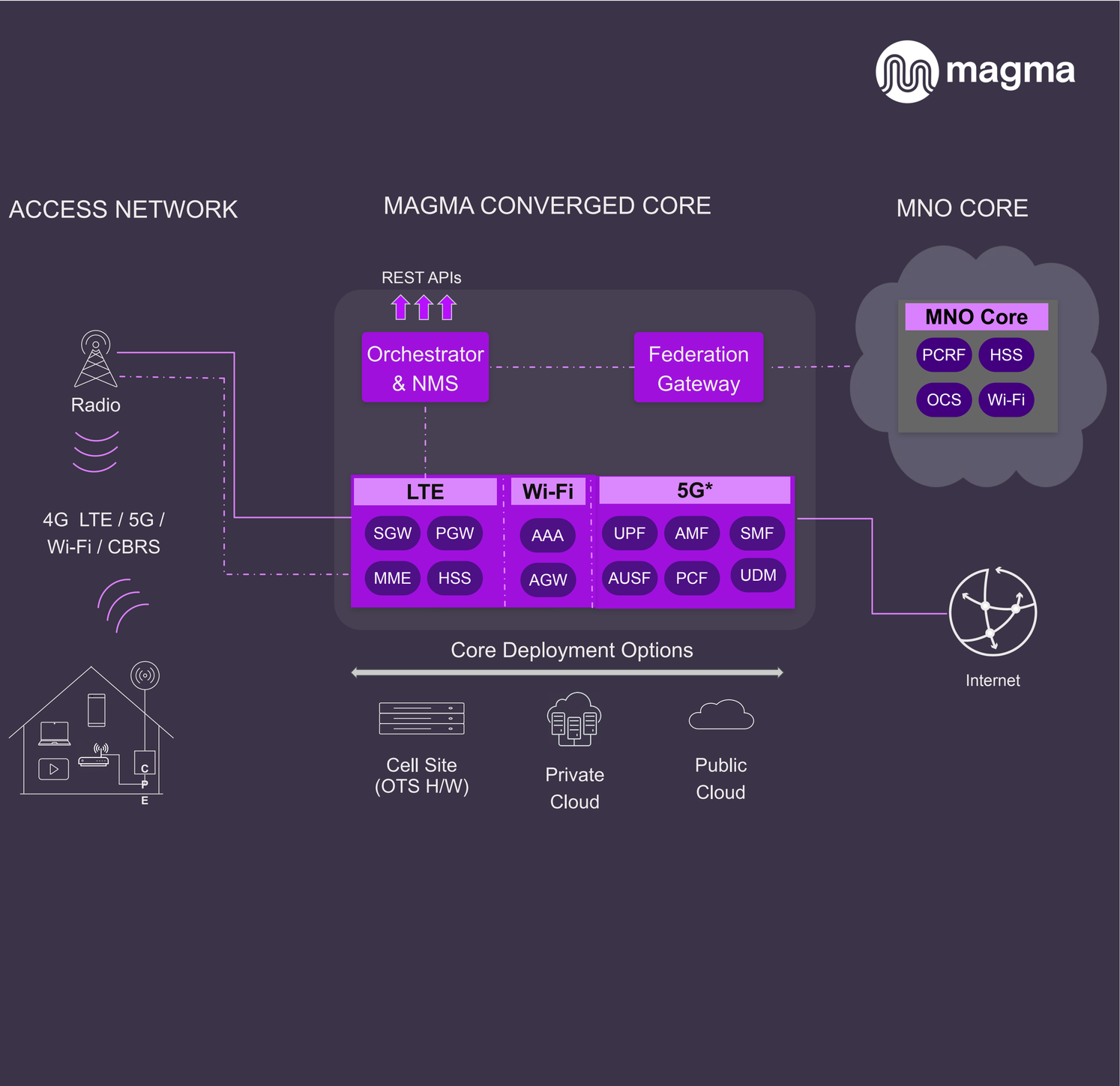
Facebook Connectivity works with network operators, equipment manufacturers, and other ecosystem partners to introduce new initiatives and develop technologies that help bring people online to a faster internet

Introducing Magma

Magma enables network operators to offer an open, flexible and scalable FWA solution

Highlights

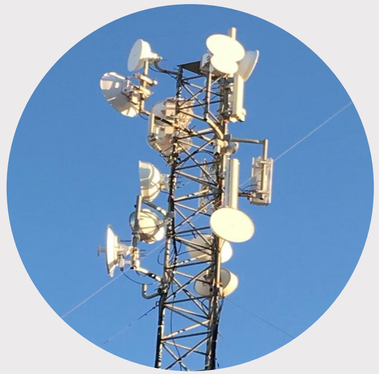
- **Open source** packet core and **free** to use
- 3GPP generation (4G or 5G) & access **network agnostic** (cellular or Wi-Fi)
- Distributed EPC with a **small footprint**
- **Cloud Managed** - Orchestrator can be deployed on a public/private cloud
- **Vendor agnostic** - works with standardized RAN H/W
- **Scales horizontally**
- Exposes REST APIs to **integrate** with 3rd-party OSS/BSS

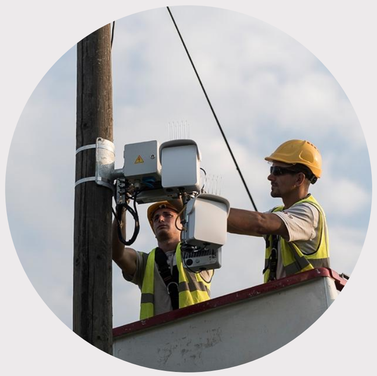


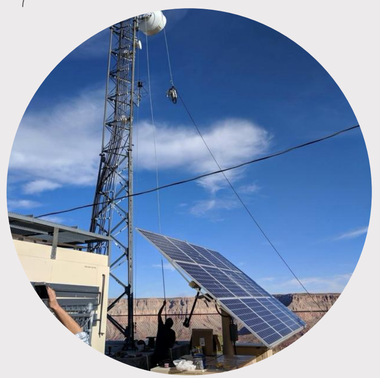
Magma Use Cases

2020 Focus Areas

2021 Roadmap







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FIXED WIRELESS ACCESS

- Offer broadband subscriptions by leveraging existing investments in LTE
- Apply network policies at local break-out points

2

CARRIER Wi-Fi

- Alleviate congestion by offloading cellular traffic to nearby Wi-Fi
- Integrate with existing core
- Easily distribute Wi-Fi profiles on user devices

3

PRIVATE LTE

- Micro EPC cloud-native form factor
- Built-in multi-tenancy
- Distributed EPC with local breakout - ideal for islands of coverage

4

MOBILE BROADBAND

- Mobility & Expansion network to rural and remote areas while protecting the existing core
- Enable rapid adoption of new RAN

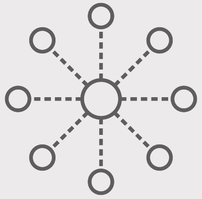
5

5G

- Offer LTE / 5G based cellular connectivity
- Apply network policies at local break-out points

TIP/OCN Collaboration

Key Tenets of an Ideal Packet Core Solution

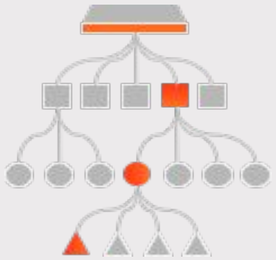


Distributed EPC with a **small footprint**

Cloud Native - Orchestrator can be on a public/private cloud

Access **network agnostic** Cellular (4G/5G NSA) or Wi-Fi

Local Breakout of subscriber traffic



Disaggregation & Scale as you **grow**

3GPP Compliant Core Integration for Auth, Policy and Charging

Magma FWA Solution

Distributed Architecture

- Enables Site by site expansion & Disaggregation
- Multiple deployment options - At Cell-site or eNodeB integrated
- Control and user plane separation
- Microservices based architecture

Cloud Native

- Orchestrator deployed in AWS
- AGW on-premise/data center (x86, ARM)

Vendor / Transport Agnostic

- Integration with any standardized eNodeBs (S1 interface)
- Pre-certified eNodeBs from Baicells, Mikrotik, Airpsan
- Backhaul agnostic - Microwave, Fiber, mmWave

Local Break-out for Internet Traffic

- Local breakout of signalling and user plane allows supporting unreliable backhaul (unlicensed)

Start small, scale as-you-grow

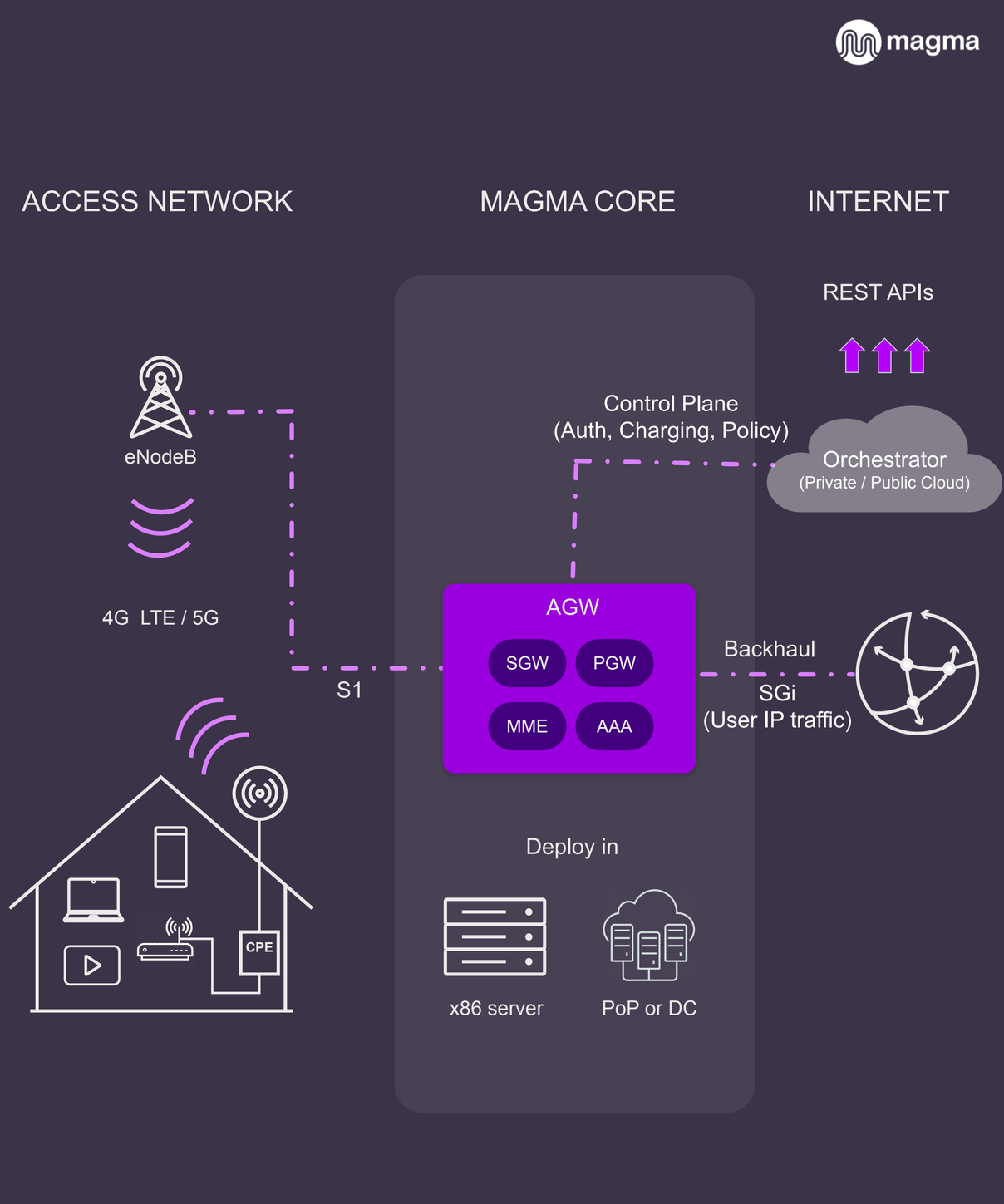
- Centrally manage all AGWs using the cloud-based orchestrator

Integrate with 3rd-party OSS/BSS

- Use REST APIs for integration

Remote Configuration and Management

- Real-time Monitoring, Reporting & Alerting
- Integrated eNB management, CPE monitoring
- Easily access KPIs for EPC and eNodeBs



Magma FWA with MNO Federation

MNO Federation for FWA

- S6a, Gx and Gy integration with operator cores, minimizes signalling

Local Break-out for Internet Traffic

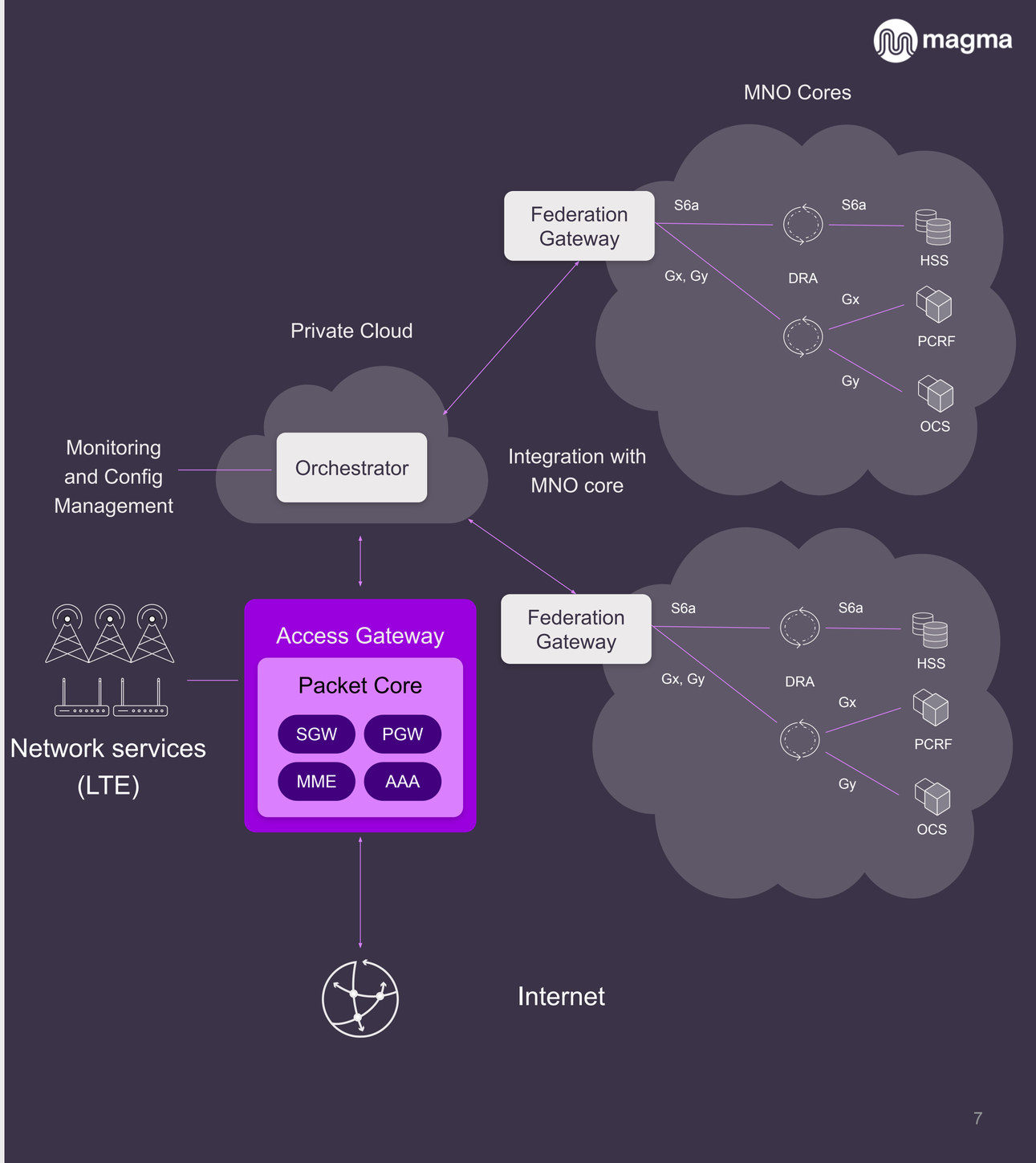
- Local breakout of signalling and user plane allows supporting unreliable backhaul (unlicensed)
- MVNO can additionally control policies towards MNOs

Network Visibility

- Full visibility and control of the network usage

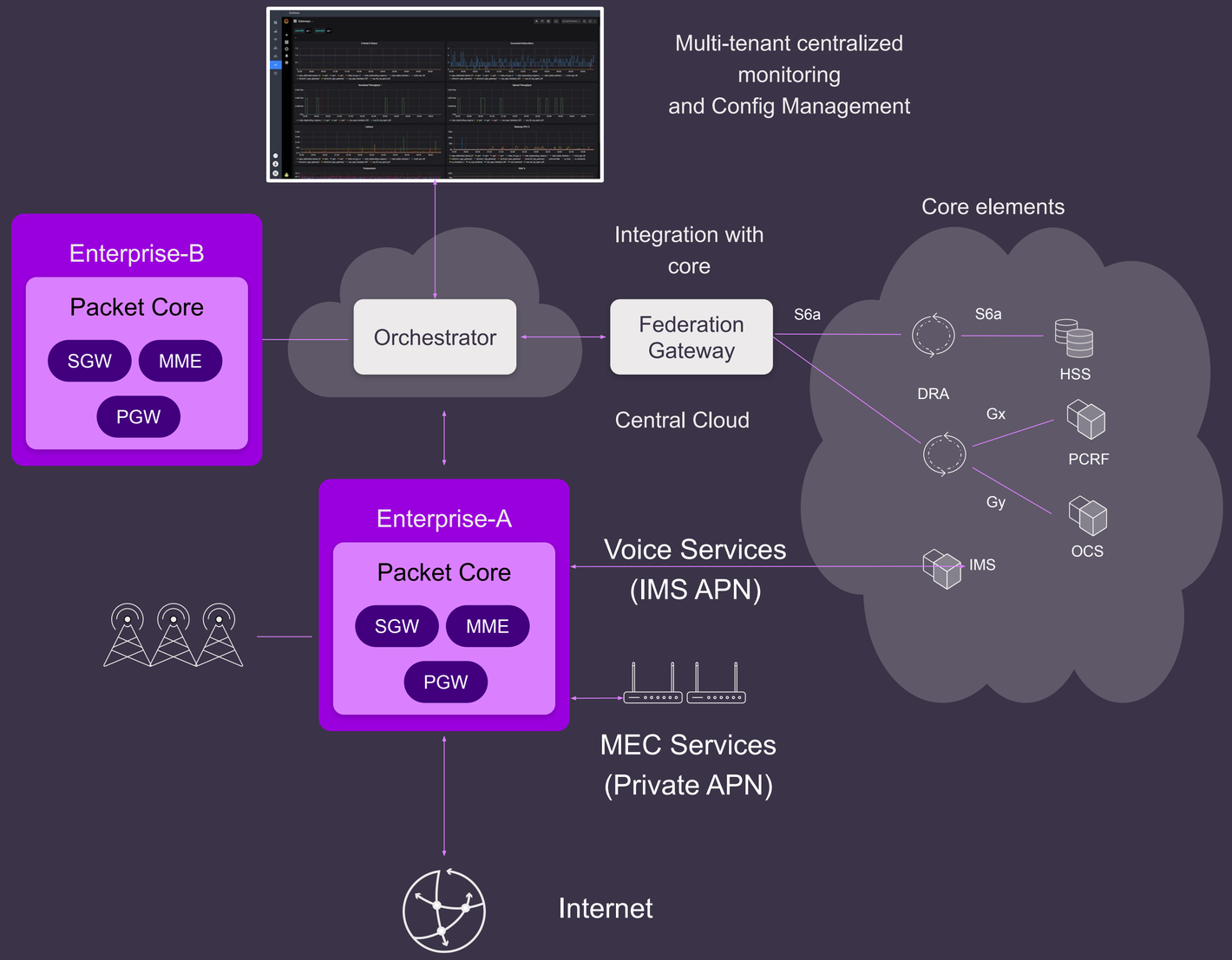
MVNO Offerings

- MVNO Core allows for independent MVNO offerings



Magma Private LTE Solution

- Distributed EPC enabling MEC use cases through local break-out
- Multi-APN support for private networks, IMS interconnect
- Native multi-tenancy managed through single UI/API surface
- LTE core upgradable to Converged 4G/5G* core
- Cloud native, scale-out micro (2vCPU) form factor



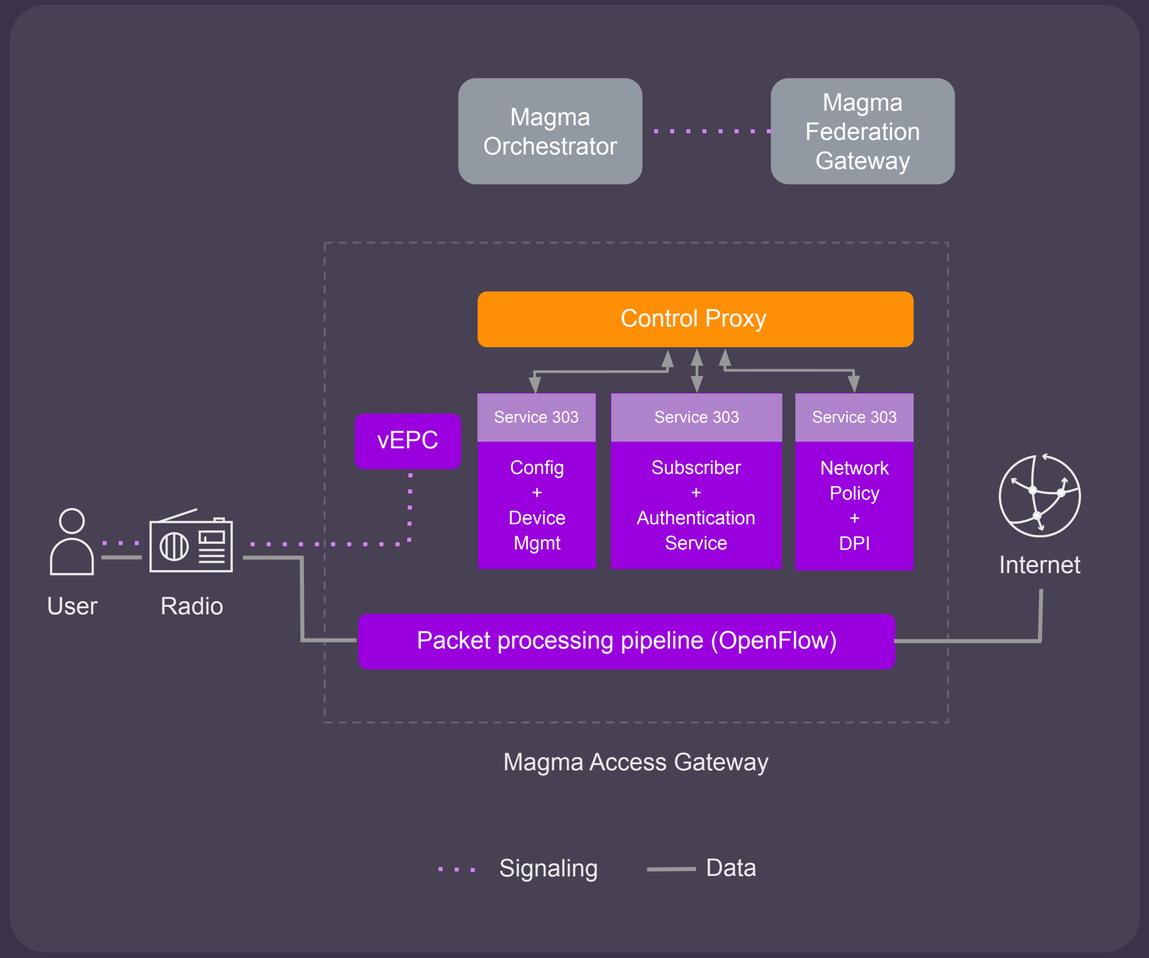
Magma Access Gateway

Legacy

- Requires all elements to be highly available - downtime of one element affects all users on the network
- Adding new types of equipment is slow and expensive
- High up-front cost and complexity, even for small networks

Magma

- Centralize network configuration and management
- Scale packet core as your RAN grows
- Terminate legacy protocols closer to users
- Local breakout for sending user traffic directly to Internet
- Decouple business logic from network controller



- LTE procedures
- Mobility Features
- Voice Features

Orchestrator Core Features

1

Remote Configuration

- Configure network devices via the common, vendor-agnostic northbound API.
- Configuration is applied asynchronously, adapting to network and device outages.

2

Real Time Monitoring

- Timeseries data from all devices is aggregated in Orchestrator.
- Monitor your KPIs and network performance in near-real time.

3

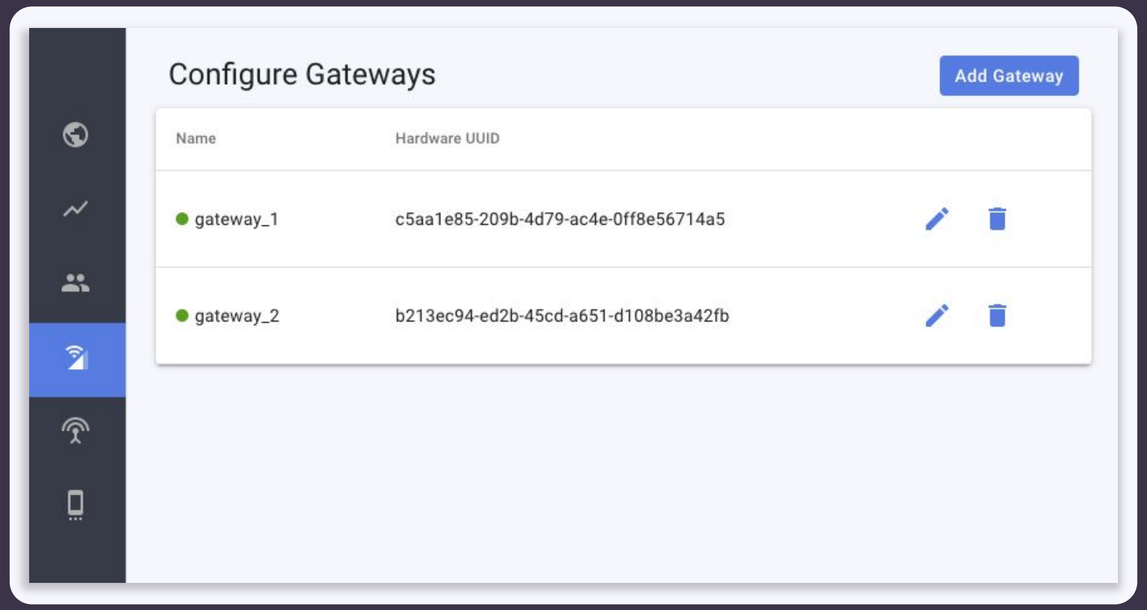
Alerting

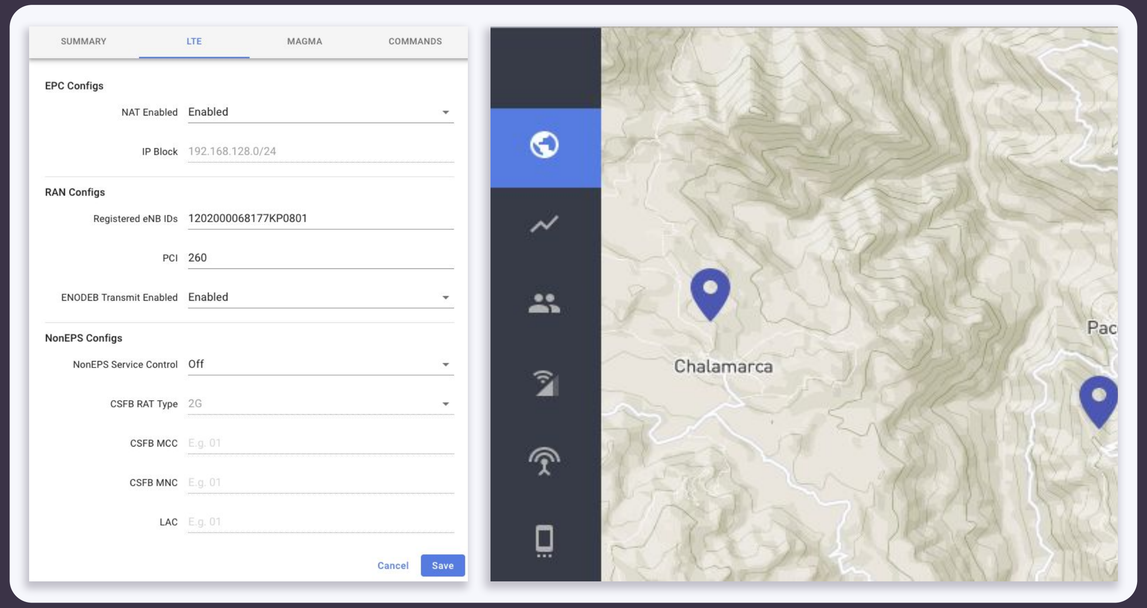
- Configure alerts based on monitoring data so you can react to network outages.
- Alerting framework supports a wide range of alert targets for integration into existing alert toolchains. (in development)

Network Management System (NMS)

Intuitive, web-based network management

- Configure and monitor network via an intuitive, web-based NMS
- A full-featured app which supports:
  - ✓ User management (incl. SSO)
  - ✓ Subscriber management
  - ✓ RAN/EPC parameters
  - ✓ Remote upgrades of field hardware
  - ✓ Multi-network management
  - ✓ Audit logging
  - ✓ Metrics and alerting





Sample Magma FWA Solution BoM

Hardware per eNodeB site	Orchestrator in AWS	Dimensioning
Access Gateway - 1 unit per eNodeB site	**Orchestrator - 1 AWS setup (up to 50 AGWs)**	
• ITX4105G motherboard • Intel® Celeron® J4105 Processor (4 cores - 2.5GHz) • 4 GB DDR4 RAM Memory (expandable to 32 GB) • 1x SSD 2.5” 120 GB (supports up to 4x 2.5” SATA disks) • 2x 1Gbps NICs (optional 2 x 10G NICs supporting 4Gbps) • Single Power Supply	• 1 x EKS cluster • 2 x t3.large EC2 workers • 4 x ELB • 2 x RDS instances • EFS access	Access Gateway - up to 12 small cell eNodeBs per site / 10k users Orchestrator - up to 50 AWGs
Rack - 1 unit per eNodeB site	**Site Switch - 1 unit per eNodeB site**	

Rack: Huawei APM30H
• Standard 1U module for 19 inch racks
• Power supply (standard)
  • Input: 100-240 VAC, 50/60 Hz
  • Max power consumption: 150 W
• Redundant power supply (optional)
  • Input: 100-240 VAC, 50/60 Hz
  • Max power consumption: 120 W
• Dimensions (W x H x L): 443.4mm x 44.45mm x 395mm
 	
Operating environment
  • Temperature: 0 - 50 C
  • Humidity: 10-90 % non-condensing
Storage
  • Temperature: 0 - 50 C
  • Humidity: 10-90 % non-condensing
	• Mikrotik 3 x RJ45 Gigabit Ethernet 10/100/1000 Mbps	

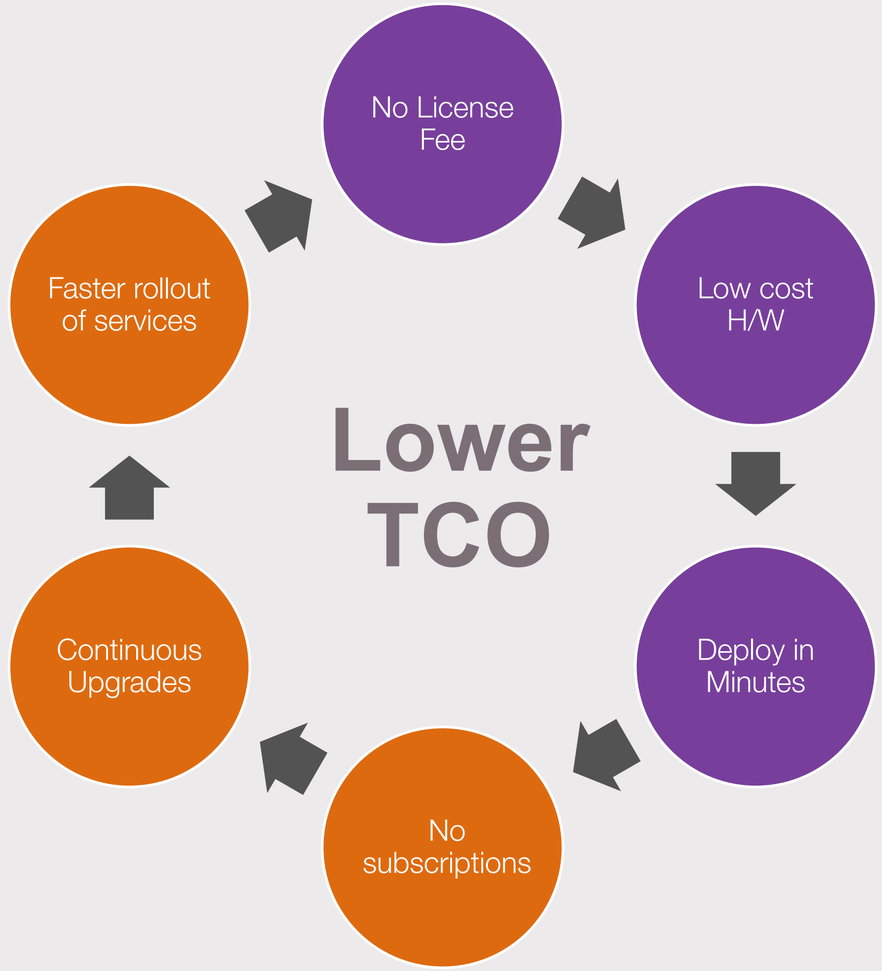
Magma's TCO is Significantly Better Than Alternatives

CAPEX Differentiators

- Off the shelf H/W vs. expensive vendor hardware
- Open source packet core vs. expensive proprietary SW
- Deploy in minutes vs. expensive white-glove service

OPEX Differentiators

- No SW subscription costs
- Ongoing upgrades and patches by Facebook using CI / CD
- Faster rollout of new services (DPI, CG-NAT etc.)



Magma offers **~90%** lower TCO than alternatives!

Thank You!

More Info - https://magmacore.org
Questions? Contact magma-info@fb.com