



Magma Overview

Leonardo Stange
Connectivity Partnerships LatAm – Facebook Inc.

Table of Contents



1. What is Magma?
2. Magma Use Cases
3. Fixed Wireless Opportunity
4. Magma Benefits
5. Magma TCO
6. Success Story
7. How We Can Partner

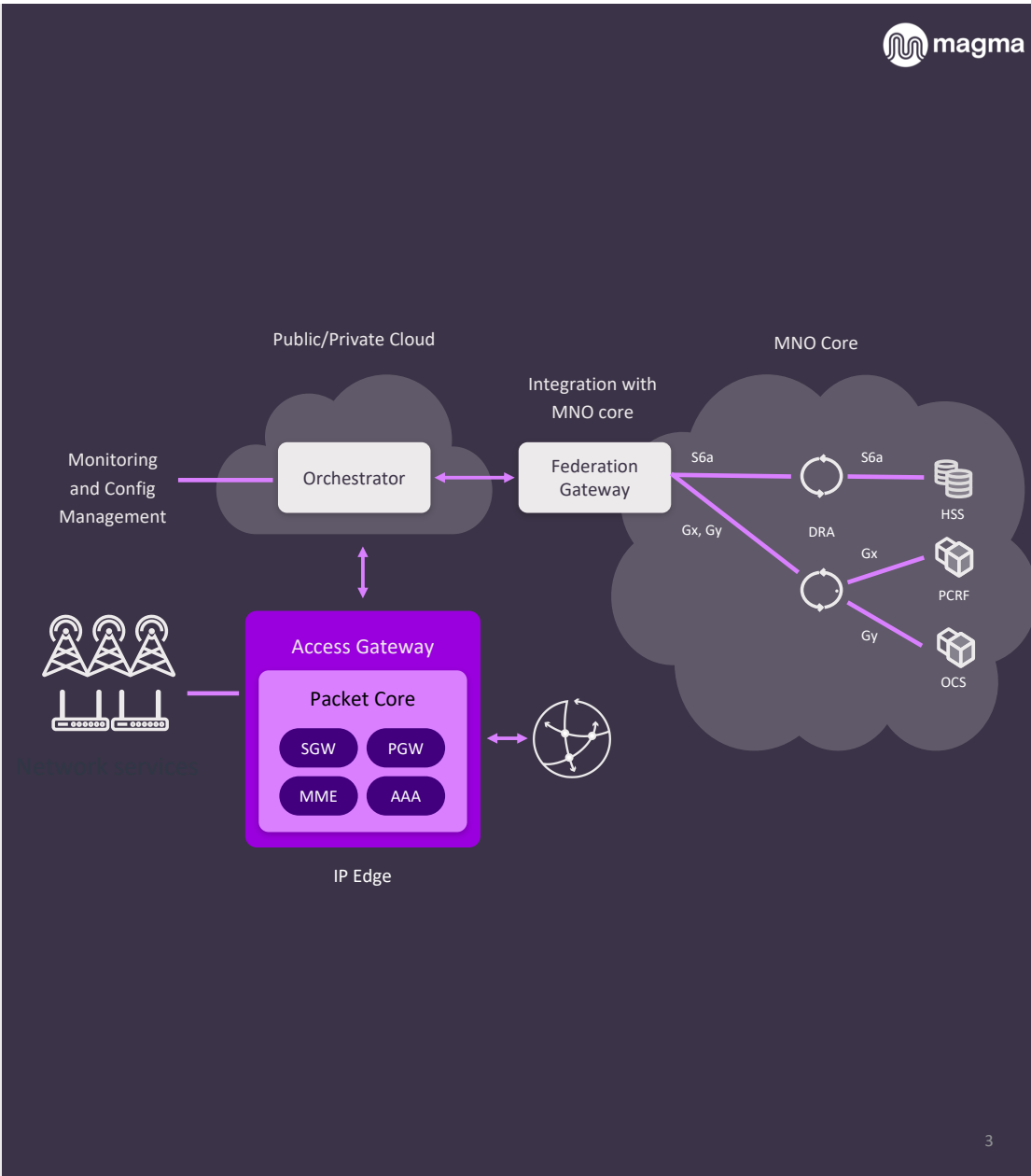
What is Magma?

Open, Flexible, Extensible Solution for Offering FWA

Magma is an **open-source software platform** that gives network operators an open, flexible and extendable mobile core network

Highlights

- **Open source** packet core and **free** to use
- 3GPP generation (2G, 3G, 4G or 5G) & access **network agnostic** (cellular or Wi-Fi)
- Distributed EPC with a **small footprint**
- **Cloud Managed** - Orchestrator can be on a public/private cloud
- Integrates with MNO core network via standard 3GPP interfaces



Magma Use Cases



1

FIXED WIRELESS ACCESS

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

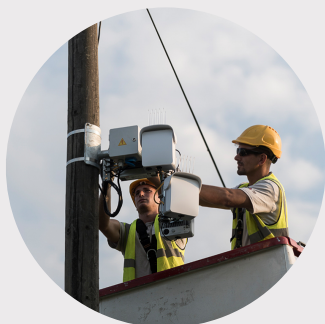
Magma Use Cases



1

FIXED WIRELESS ACCESS

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



2

PRIVATE LTE

- Offer cellular connectivity in difficult to reach areas
- Rapidly validate shared spectrum technology
- Reduce integration costs for neutral host networks



3

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



4

NETWORK EXPANSION

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



5

MOBILE BROADBAND

- Offer LTE / 5G based cellular connectivity
- Apply network policies at local break-out points
- Integrate with 3rd party systems (e.g., OSS) via APIs

Connectivity In Brazil

GROWTH OF FIXED BROADBAND (USERS)

64M^{TO} 80M+

by 2022

WISPs WITH LTE LICENSE

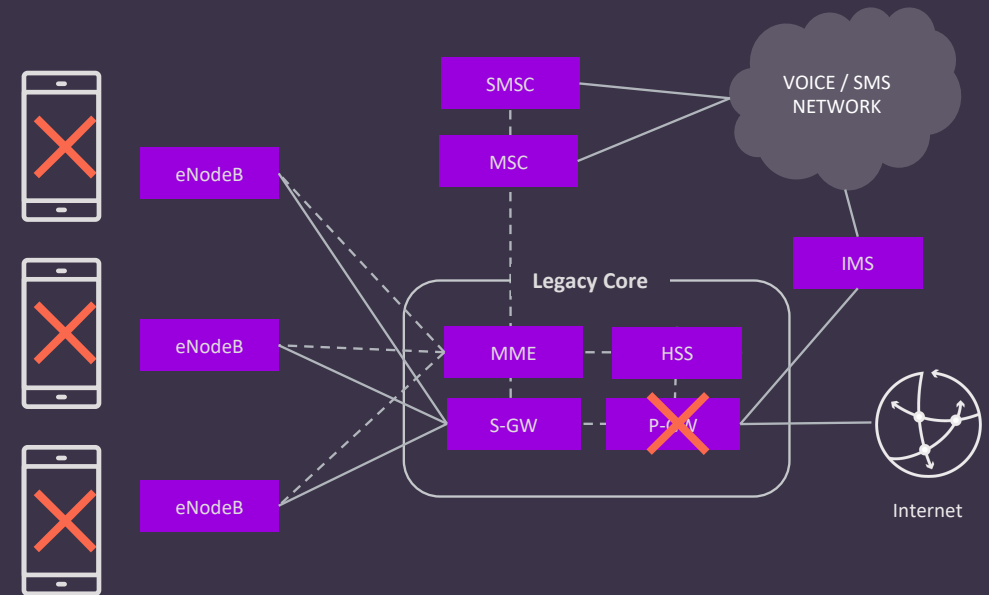
110+ WISPs

Covering 1,370+ municipalities

Legacy Cores Have High Cost and Complexity for FWA Deployments

Legacy Core Disadvantages

- ✗ **High up-front cost and complexity**, even for deploying small networks.
- ✗ **Single point of failure** – Requires all elements to be highly available; downtime of one element affects all users
- ✗ **Does not scale easily** – Each element must scale-up to handle more load
- ✗ **Expensive to scale up** – EPC priced per user or based on total user plane traffic
- ✗ **Inflexible** - Adding new types of equipment is slow and expensive

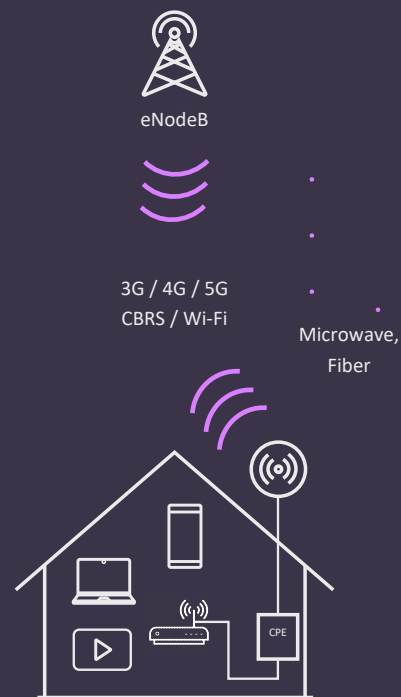


Magma Offers an Open, Flexible, Extensible Solution for FWA

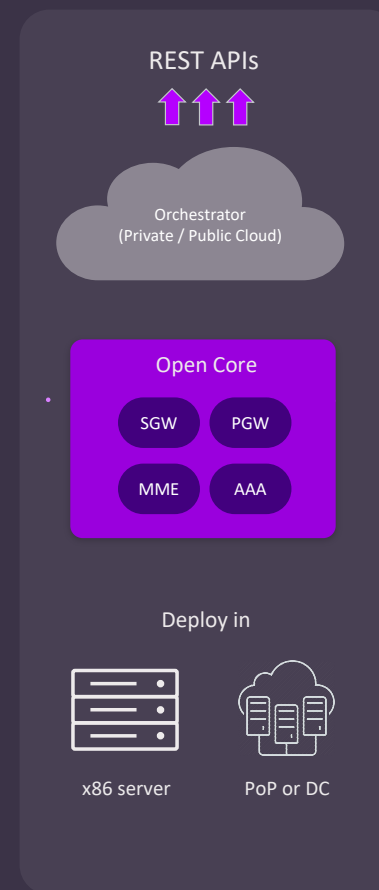
Magma Advantages

- ✓ Much lower TCO than alternatives (no license fees)
- ✓ Local break-out with support for Auth, Policy, Charging at a subscriber-level
- ✓ Start small and scale as your network grows
- ✓ Faster Time to Market w/ lower cost technology and re-use of existing investments. No vendor lock-in (open source)
- ✓ Flexible deployment options for orchestrator – Public / Private cloud
Standardized REST APIs to configure and monitor network devices

ACCESS NETWORK



CORE



INTERNET



Magma's TCO is Significantly Better Than Alternatives

CAPEX Differentiators

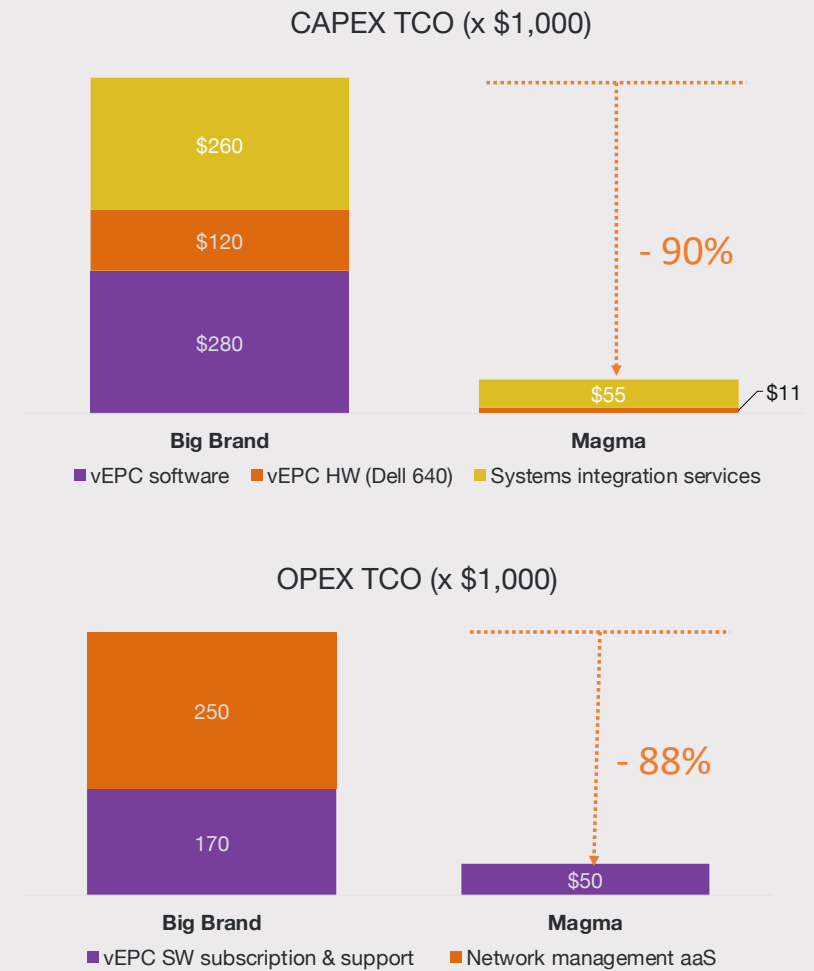
- Off the shelf H/W vs. expensive vendor hardware
- Open source packet core vs. expensive proprietary SW
- Deploy in minutes vs. expensive white-glove service

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 **~89%** lower TCO than alternatives (~\$1 per user)

Note: Cost based on 10K users, 50 Gbps of UP throughput; Magma running on Dell PowerEdge R240



FWA Success Story – iConecta in Brazil

Magma deployment in Brazil

Project Highlights

- iConecta (WISP) is rolling out FWA across 6 sites (12 eNBs)
- Arcangelli is the SI responsible for setting up the Magma core (AGW HW, setup and integration + Orc8r)
- **RAN:** Deploying LTE dual-carrier eNBs from Mikrotik (InterCell, bands 38/39);
- **Backhaul:** Microwave (up to 367 Mbps) and Fiber
- **Magma Orc8r** is deployed in AWS
- iConecta will offer Mi-Fi devices to the customers along with a simple data plan with flat pricing for X GB per month



- Contact your Systems Integrator for integrating Magma into your network
- Scan QR code below for link to documentation, pre-requisites and quick start guide



For more details, please reach out to us!
Email - Leonardo Stange <lstange@fb.com>



f Magma 1.0.0

Basics

Introduction

Prerequisites

Quick Start Guide

Orchestrator

Access Gateway

Federation Gateway

Symphony

Introduction

Magma is an open-source software platform that gives network operators an open, flexible and extendable mobile core network solution. Magma enables better connectivity by:

- Allowing operators to offer cellular service without vendor lock-in with a modern, open source core network
- Enabling operators to manage their networks more efficiently with more automation, less downtime, better predictability, and more agility to add new services and applications
- Enabling federation between existing MNOs and new infrastructure providers for expanding rural infrastructure
- Allowing operators who are constrained with licensed spectrum to add capacity and reach by using Wi-Fi and CBRS

Magma Architecture

The figure below shows the high-level Magma architecture. Magma is designed to be 3GPP generation and access network (cellular or WiFi) agnostic. It can flexibly support a radio access network with minimal development and deployment effort.

Magma has three major components:

- **Access Gateway:** The Access Gateway (AGW) provides network services and policy enforcement. In an LTE network, the AGW implements an evolved packet core (EPC), and a combination of an AAA and a PGW. It works with existing, unmodified commercial radio hardware.
- **Orchestrator:** Orchestrator is a cloud service that provides a simple and consistent way to configure and monitor the wireless network securely. The Orchestrator can be hosted on a public/private cloud. The metrics acquired through the platform allows you to see the analytics and traffic flows of the wireless users through the Magma web UI.
- **Federation Gateway:** The Federation Gateway integrates the MNO core network with Magma by using standard 3GPP interfaces to existing MNO components. It acts as a proxy between the Magma AGW and the operator's network and facilitates core functions, such as authentication, data plans, policy enforcement, and charging to stay uniform between an existing MNO network and the expanded network with Magma.

The diagram illustrates the high-level Magma architecture, showing the interaction between the Public/Private Cloud, IP Edge, and Operator Core.

- Public/Private Cloud:** Contains the **Orchestrator** (with a NOC Dashboard and REST API) and the **Federation Gateway**. The Orchestrator communicates with the Federation Gateway via **GRPC (HTTP2 + TLS)**.
- IP Edge:** Contains the **Access Gateway** (which includes **SGW**, **PGW**, and **MME**). The Access Gateway communicates with the Orchestrator via **GRPC (HTTP2 + TLS)** and with the radio access network (represented by antennas and **TR069**, **S1** interfaces) via **S1**.
- Operator Core:** Contains various network functions: **SGs**, **MSC/VLR**, **HSS**, **PCRF**, and **OCs**. The Federation Gateway acts as a proxy, connecting to these functions via standard 3GPP interfaces: **S6a** (to HSS), **Gx** (to PCRF), **Gy** (to OCs), and **Gs** (to SGs).
- External Network:** The Access Gateway connects to the external network (represented by a globe) via the **SGI** interface.

PREREQUISITES

The Facebook Connectivity logo, which includes a white circular icon with three curved lines on the left, and the text 'facebook' in a small, lowercase font above the word 'connectivity' in a larger, bold, lowercase font, all in white.