



> BUSINESS MADE **SIMPLE**

UMB Deployment Options

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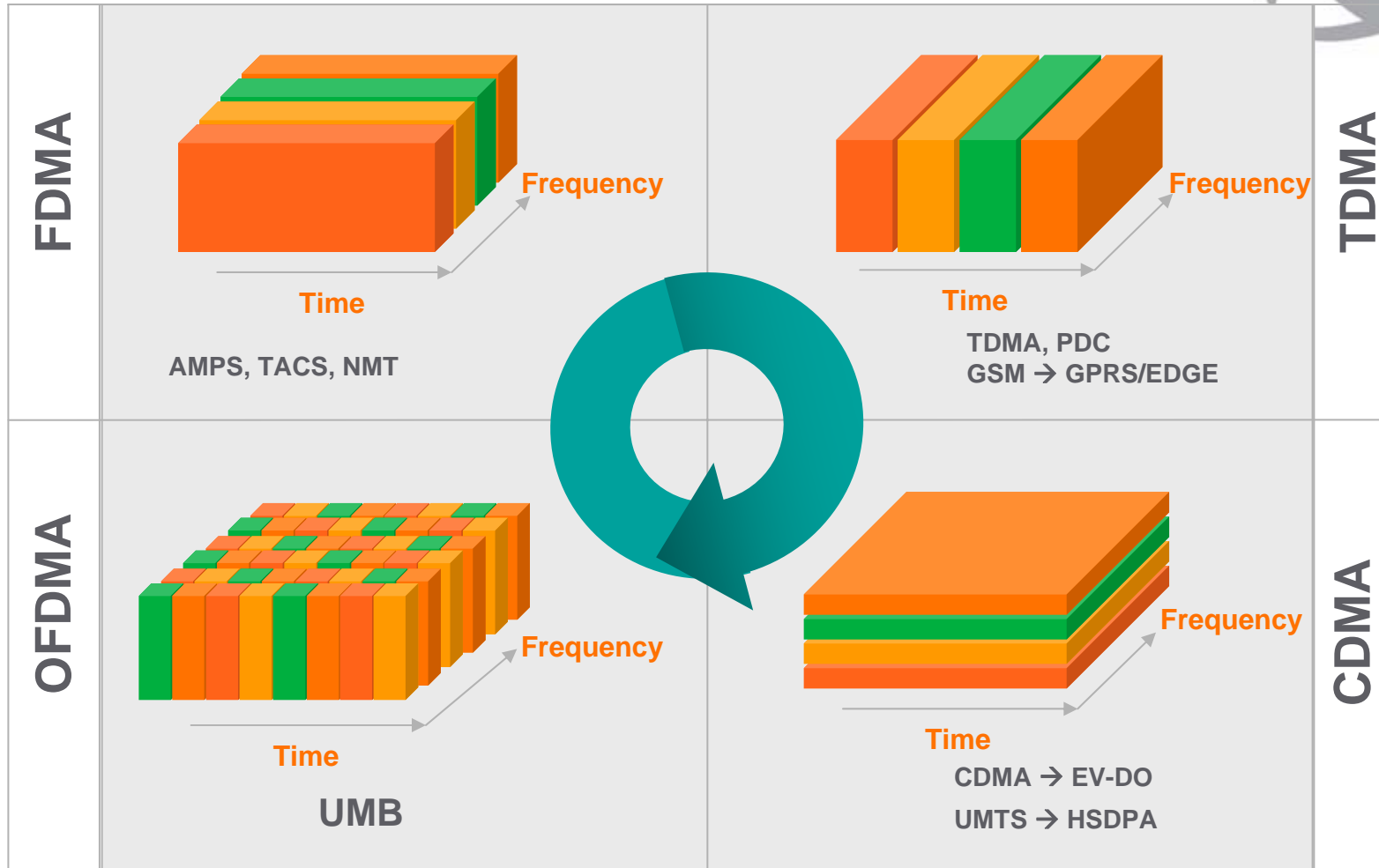


Agenda

- > Evolution to OFDM and flatter network architecture
- > Mobility Management in UMB
- > Deployment flexibility
- > Summary

OFDM Improves Radio Access Efficiency

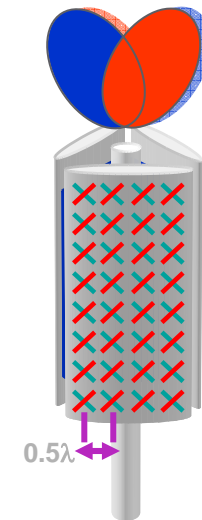
Moving from Voice to Broadband with VoIP



OFDM - scalable and most cost effective broadband solution

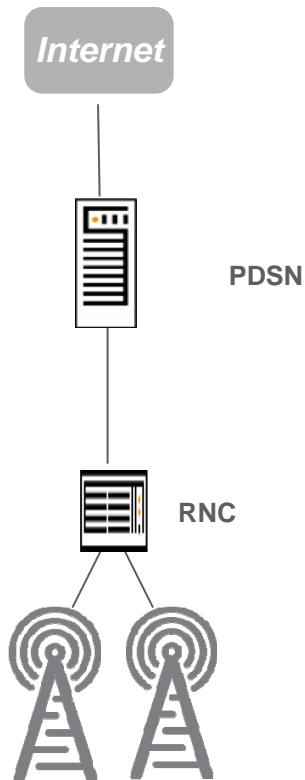
Advanced Antenna Techniques

- > Single Input Single Output (SISO) with receive diversity
- > Multiple Input Multiple Output (MIMO) Configuration
 - Provides higher spectral efficiency
 - Higher peak data rate
 - Up to 4x4 MIMO configuration
- > Spatial Diversity Multiple Access (SDMA)
 - Reduced interference
 - Better cell coverage
- > Combination of MIMO and SDMA to optimize network performance

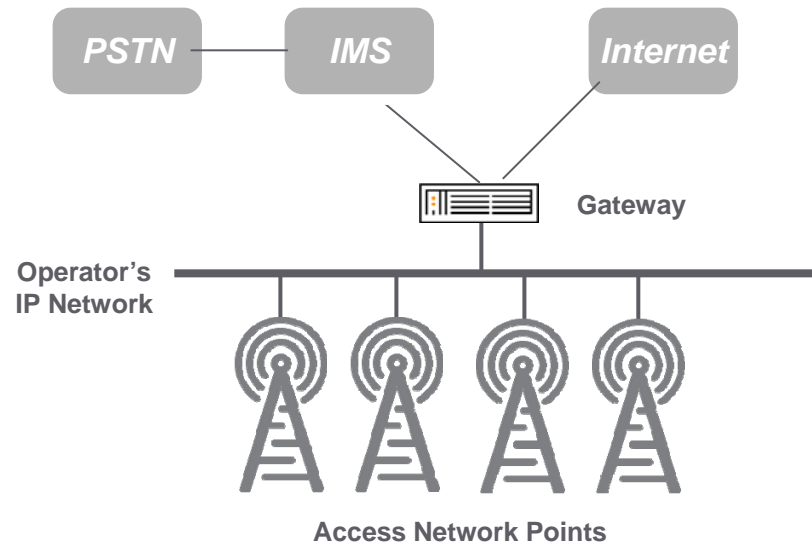


Higher Spectral Efficiency and Better Cell Coverage

Evolution from 1xEV-DO to UMB



UMB Flat IP Architecture

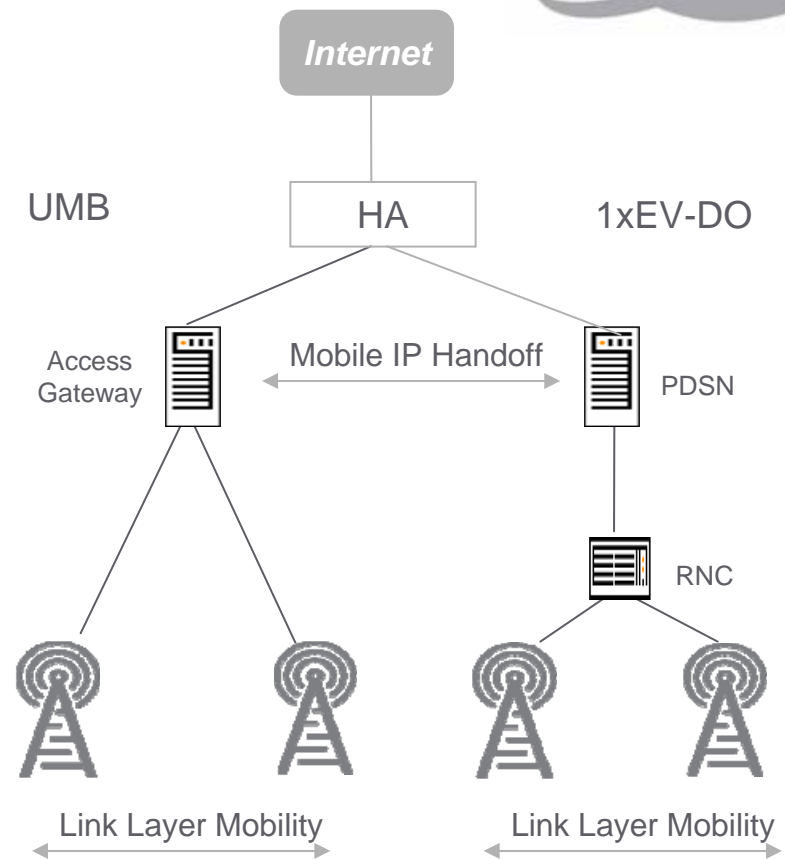


Evolution to a flatter network architecture – less nodes in network
Better performance for real time application – lower latency

Mobility Management



- > Mobility at link layer as well as IP Layer
 - Multi-route solution for link layer mobility
 - Support of Mobile IP
- > Elegant link layer multi-route design
 - Multi-route to avoid ping-pong problem
 - Resource pre-allocation to minimize delay
 - Data traffic forwarding to prevent data loss
- > Mobile IP handoff to 1xEV-DO network



UMB supports seamless mobility



Enhanced Performance with Deployment Flexibility



- > Designed for efficient overlays as well as greenfield deployments
 - Macro-cellular, Micro-cellular & Hotspot deployments
- > Support of FDD and TDD modes
- > Support of various Frequency Bands
 - Cellular band (800 MHz), PCS band (1900 MHz), AWS band (2.1/1.7 GHz)
 - In addition - 450 MHz, 700 MHz and various other frequency bands
- > Flexibility of bandwidth and peak data rates

Channel Bandwidth	Peak Data Rate* (2x2 MIMO)	Peak Data Rate* (4x4 MIMO)
1.25 MHz	9 Mbps	18 Mbps
5 MHz	34 Mbps	65 Mbps
10 MHz	72 Mbps	137 Mbps
20 MHz	154 Mbps	291 Mbps

* Based on certain overhead and coding assumptions

UMB addresses broad operator needs



Summary

- > OFDMA/MIMO physical layer provides higher spectral efficiency and peak data rate up to 291 Mbps
- > UMB offers multiple advance antenna techniques to optimize network performance
- > Evolution to a flatter network architecture for lower latency and simpler network deployment
- > Seamless mobility across the network
- > All these UMB attributes allows operators with lot of deployment flexibility