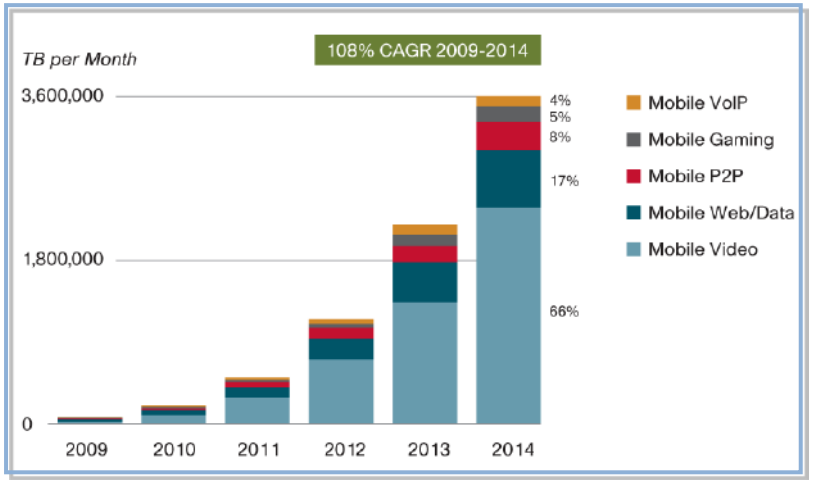
BLiNQ NETWORKS

Leveraging Underutilized Spectrum sub 4GHz

May 23, 2011

Putting the Opportunity in Perspective

Smartphones & Social Networking Changed Everything



Source: Cisco Visual Networking Index.

Bridging the Capacity Gap	
Expected Capacity (2015)	~32x
WiFi / Femto Offload	2x
New Spectrum	2x
LTE	2x
Other Techniques	2x
Total Capacity	~16x
Capacity Shortfall	**~50%**

Mobile data traffic will **double** every year: 2014 is **39x** 2009

Video traffic share to increase from **40%** in 2009 to **66%** in 2014

Heterogeneous networks (small cells) need to account for remaining **50%** of expected capacity shortfall

Mobile data already surpassed voice traffic* and is expected to double every two years: Wireless networks must adapt to meet expected demand and quality of service

* Hans Vestberg, Ericsson President and CEO, 3/23/10

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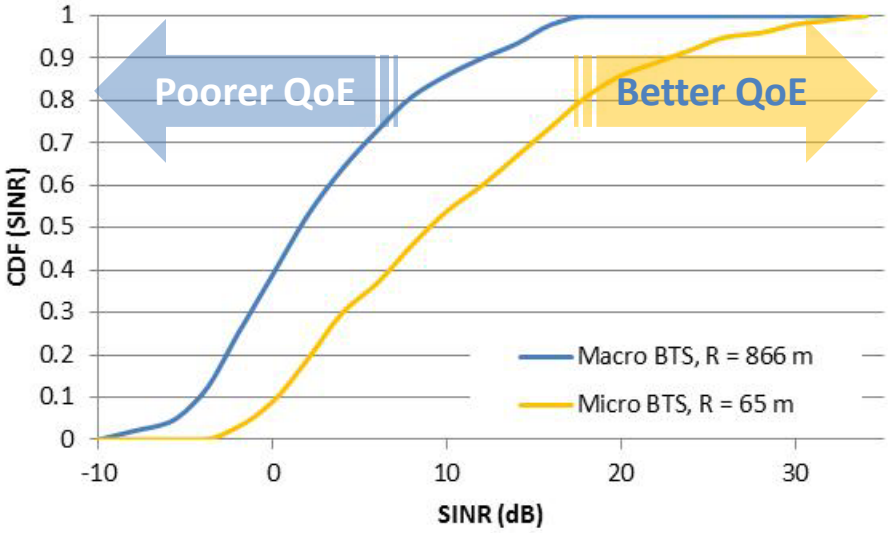
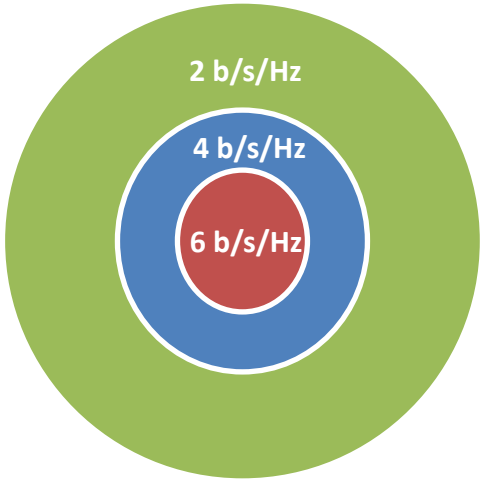
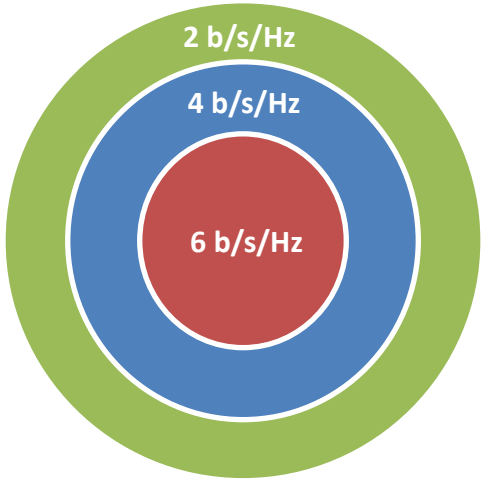
Product Deployment Scenario

Benefits of Small Cells







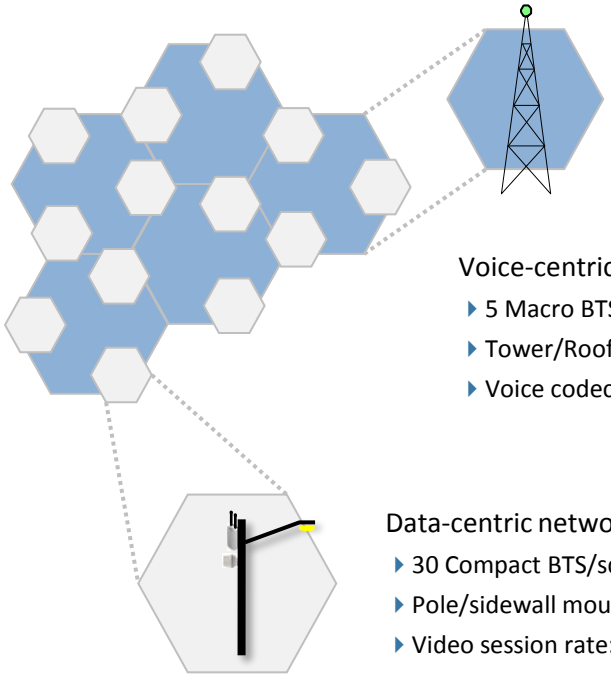
- Low Interference
- Higher throughput
- Target “Hot Sectors”
- Relieve Capacity Bottlenecks
- Reduce need for Macro Build
- Reuse existing Access spectrum

Preben Mogensen, et al, “LTE Capacity compared to the Shannon Bound,” IEEE 65th Vehicular Technology Conference, 2007. VTC2007-Spring. April 2007.

Impact on Backhaul Network

Network Growth: Deployment Implications

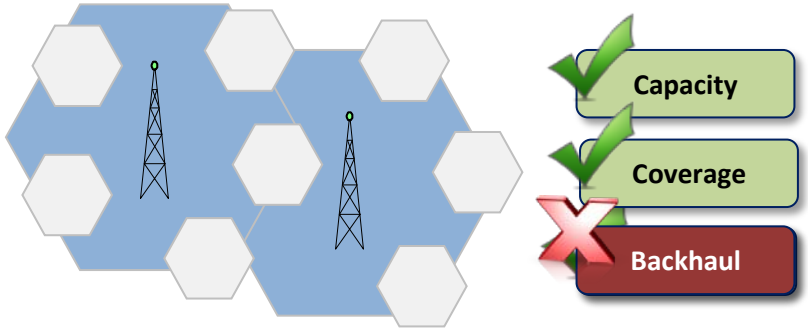
- Increase site density to increase network capacity (e.g. Metrozones)
  - Compact base stations (all-outdoor, zero-footprint)
  - WiFi Access node



Voice-centric network
- 5 Macro BTS/sq. km
- Tower/Rooftop sites
- Voice codec rate: 14 kbps

Data-centric network
- 30 Compact BTS/sq. km
- Pole/sidewall mounts
- Video session rate: > 300 kbps

Backhaul Implications



- Traditional backhaul model does not scale
  - LOS not always available
  - Leased line is short of capacity, TDM & expensive
  - Fiber is the leading alternative
    - Expensive
    - Provisioned for peak demand
    - Slow deployment
    - Incumbent competitive advantage

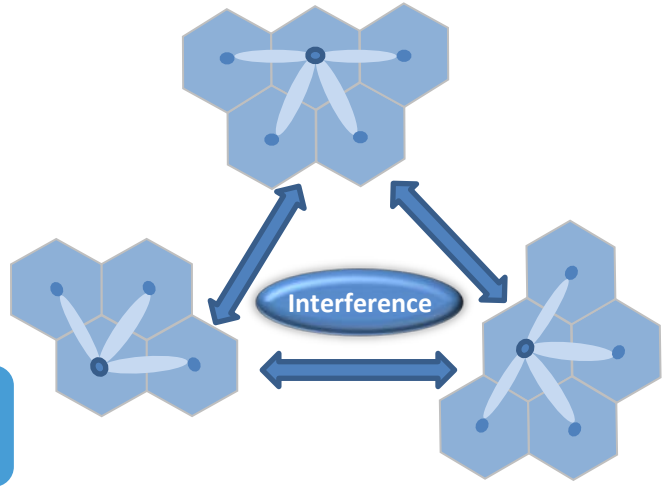
The Solution: BLiNQ Networks

NLOS: Non-line-of-sight capabilities in low-cost sub 6 GHz spectrum allows ubiquitous deployments

Intelligence: Detection and coordination of network interference to maximize backhaul network capacity

SON: Self-organizing network of backhaul access nodes for ease of deployment and operation

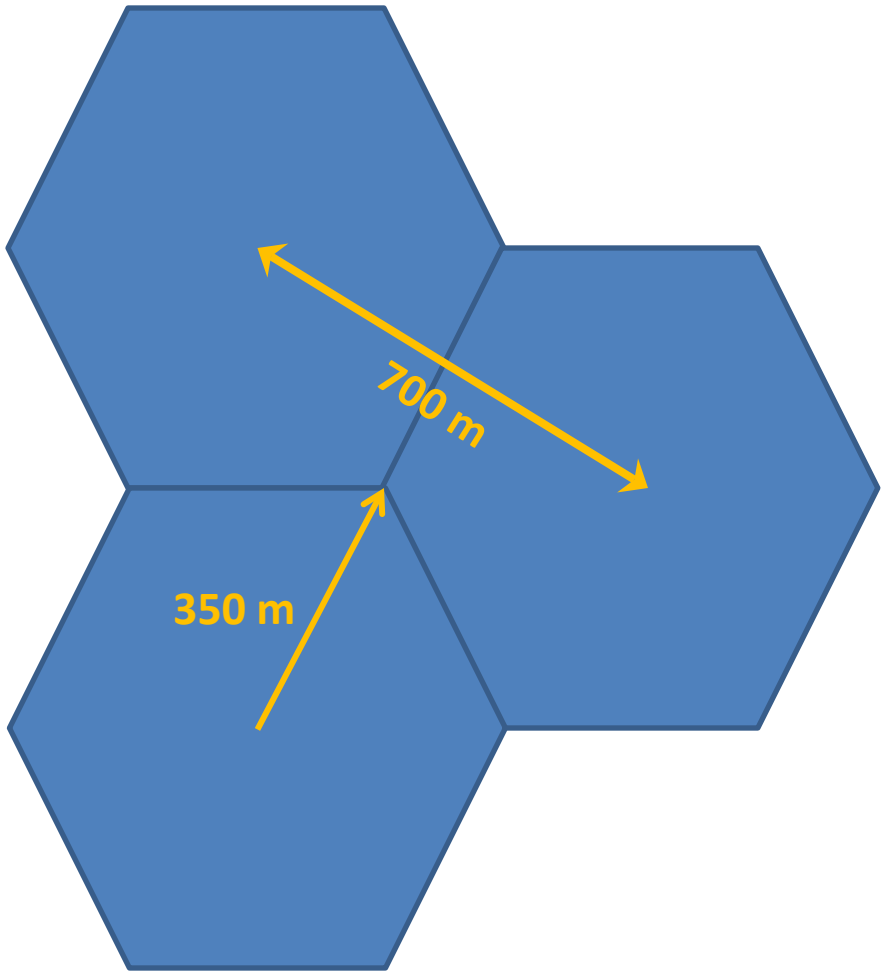
Performance: Shared resource that leverages wide area access principles to provide best in class features, performance & cost tradeoffs



Technology Leader Through Nortel IP Acquisition & Top Tier Carrier Engagement

Typical Macro Cell Size in Dense Urban Area

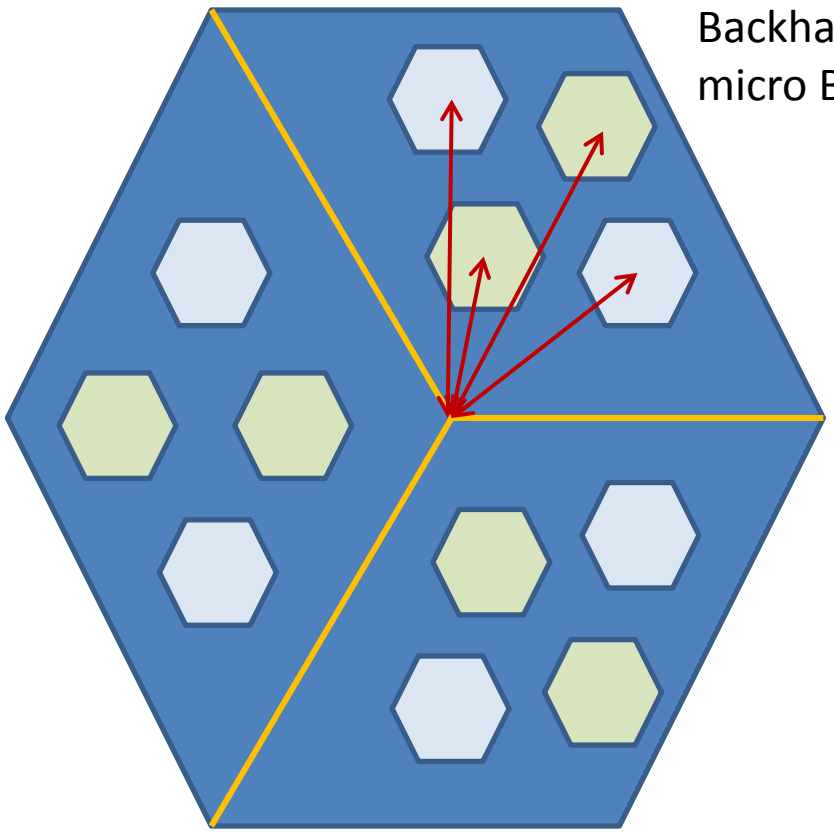
- Hub to RBM distance not expected to exceed 500 m
- Macro BTS height is typically 30-40 meters in urban core



3.2	Sites/Sq. km
347	Cell Radius
694	Inter-Site Distance

Macro-Micro Deployment Scenario

- Roll out 2-6 micro base stations per sector
- PMP backhaul of micro base stations to hub module on macro base station site
- Link distance < 350 m
- Hub at 30-40 m
  - Fiber, LOS MW POP
- RBM at 6-10 m
  - Public infrastructure asset (e.g. pole)



Micro BTS Cell Radius* < 140 m

* *Based on 20 micro cells per square km*

Product Features

Backhaul Module (Remote & Hub)

Antennas	Client: Integrated X-pol Hub: External
MCS/Processing	Up to 256QAM 7/8 2x2 MIMO
Weight	< 5 kg
Dimensions	20 x 30 x 10 cm
Power Consumption	< 60 W
Bandwidth	10/7 MHz
Bands	2.3, 2.5 & 3.x GHz
Connectivity	Copper 1000 BaseT Optional Fiber Gig-E
Synchronization	GPS & IEEE 1588v2

Performance

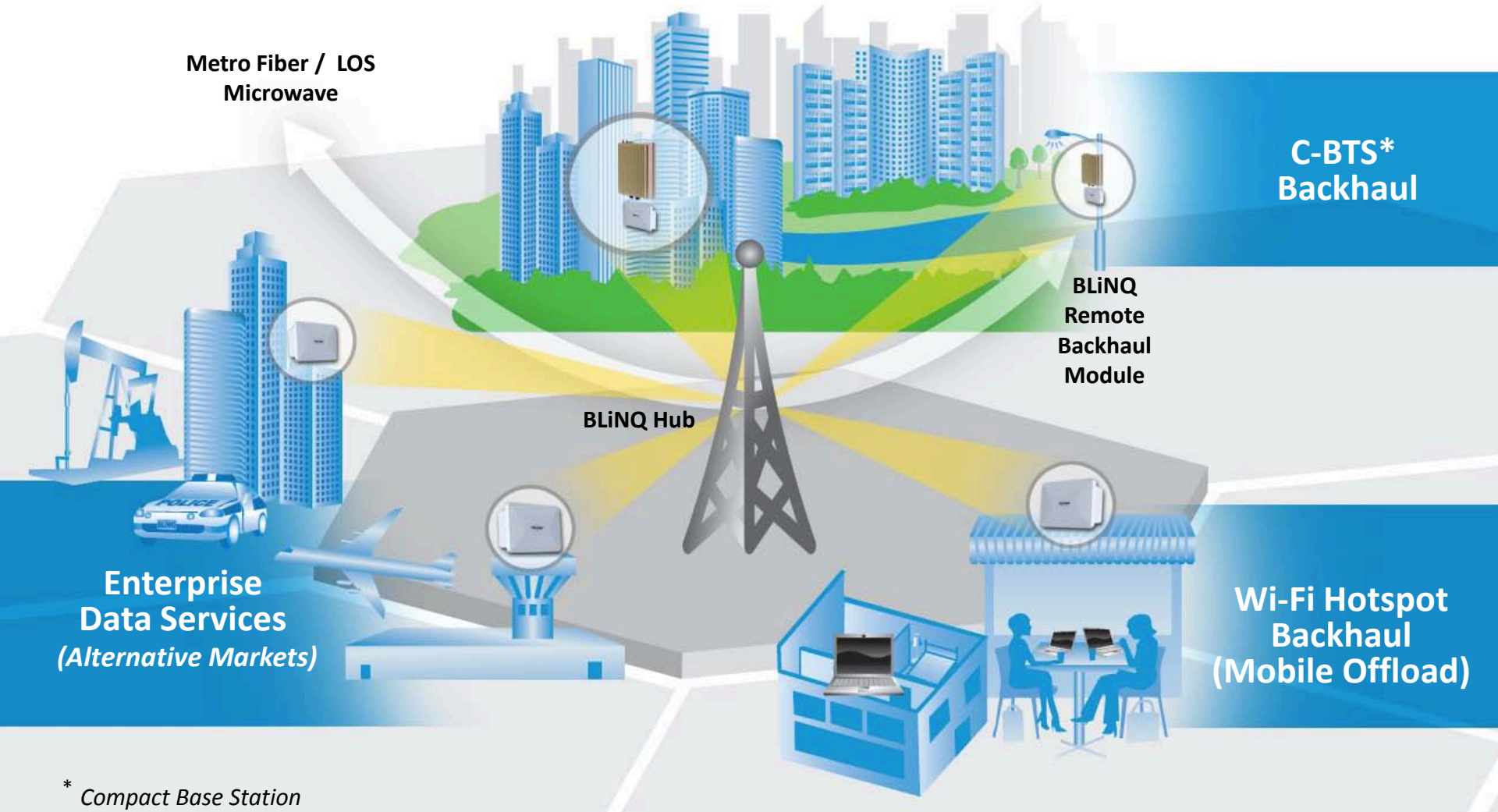
Spectral Efficiency	> 9 bps/Hz (R2)
Link throughput	up to 91 Mbps (10 MHz channel)*
Frequency Planning	N = 1 (SON)

Backhaul OA&M / SON

Configuration	Nortel CPS code
EMS / Protocol	SNMP v2c/v3

** Roadmap to 1 Gbps Link Capacity; 91 Mbps is R2 capacity*

Deployment Scenarios



* *Compact Base Station*

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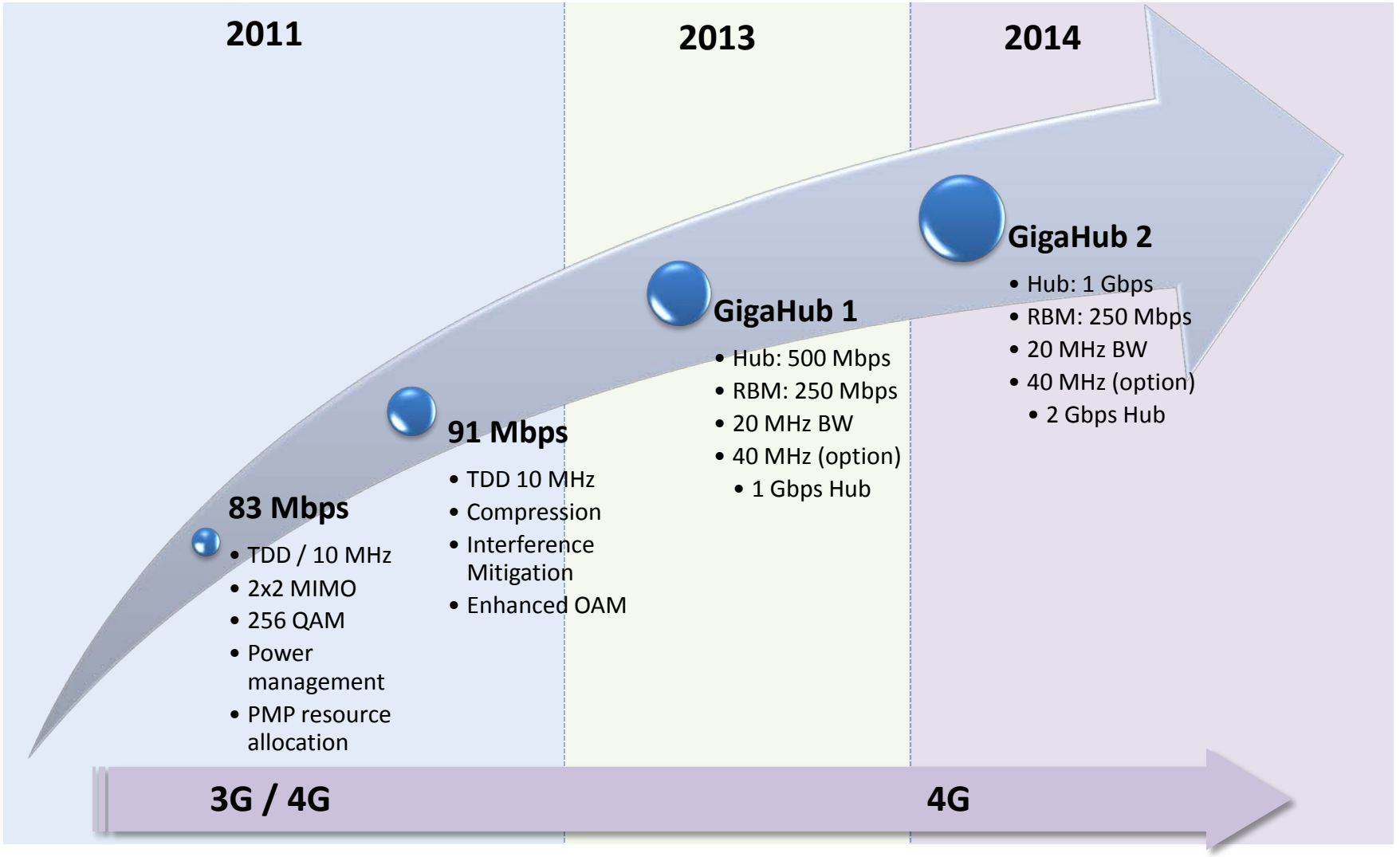
Intelligent NLOS Wireless Backhaul Network

- 83 Mbps PTP or PMP link in 10 MHz channel
  - > 8 bps/Hz spectral efficiency (Release 1)
- Evolution to 1 Gbps shared link (GigaHub)
- 2.3, 2.6 & 3.x GHz bands – Fast Track Spectrum Bands Possible
- Self-organizing network (SON) / cognitive solutions

Silicon Capacity Roadmap



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Het Net - Keys to Success

- Small cell product ecosystem
- Cost effective back haul solutions
- Deployment practices/SON
- 20 MHz bands of TDD spectrum
  - 3500 MHz – 3650 MHz
  - 1675 MHz – 1710 MHz
  - 1755 MHz – 1780 MHz
  - 4200-4220 MHz – 4380-4400 MHz

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