DAS and Enterprise Solutions

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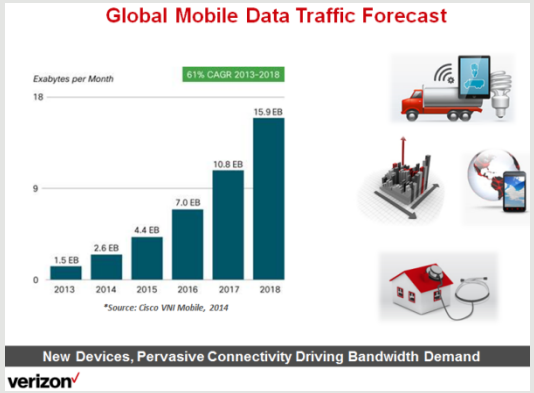
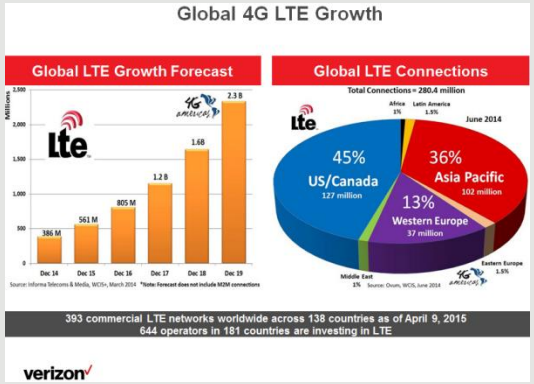
Challenges facing the business…





40% Data growth expected in 2016

- More services – M2M, CATM
- Increased usage per device

Competition is fierce – revenue growth is not keeping pace

We are not going to stop building so we need to simplify the organization and reduce cost

The status quo is our biggest challenge, we have to evolve faster and embrace change and new opportunities

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Solutions…

Increase capacity

- Densification, C-RAN
- Carrier Aggregation, CoMP, feICIC
- Cat-1, M2M Core, Cat-M, NB-LTE

Modernization

- RET, 4T, 4R, RRH
- SON
- eMBMS and MooD

Aggressive spectrum management

- Re-farming
- LTE-U/LAA

Getting closer to the customer

- In-building cost structures and RFPs
- New delivery methods- VoWiFi, eFemto, SpiderCloud…
- Continue Small Cell growth

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Legacy Enterprise Solutions

No direct path to the carrier

Projects driven by local teams as full projects if accepted

Capital and operational expense paid by the service provider

Current Enterprise Solutions

Carriers have developed In-Building Teams but a formal process does not exist

Signal sources are the critical elements

Equipment vendors are often the go-between

The cost burden has shifted to the enterprise (zero rent, signal only)

Future Enterprise Solutions

Formal processes are being finalized

Deployment strategies are focused on simplicity and reducing recurring costs

Outlining performance responsibilities is critical

Signal source development will continue to include more entries to the SeGW

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Traditional solutions…

Macro eNodeB

Remote Radio

Micro
RRU/RRH

oDAS
iDAS

- Dedicated backhaul
- Hardened facilities
- Backup power
- Reliable
- Expensive

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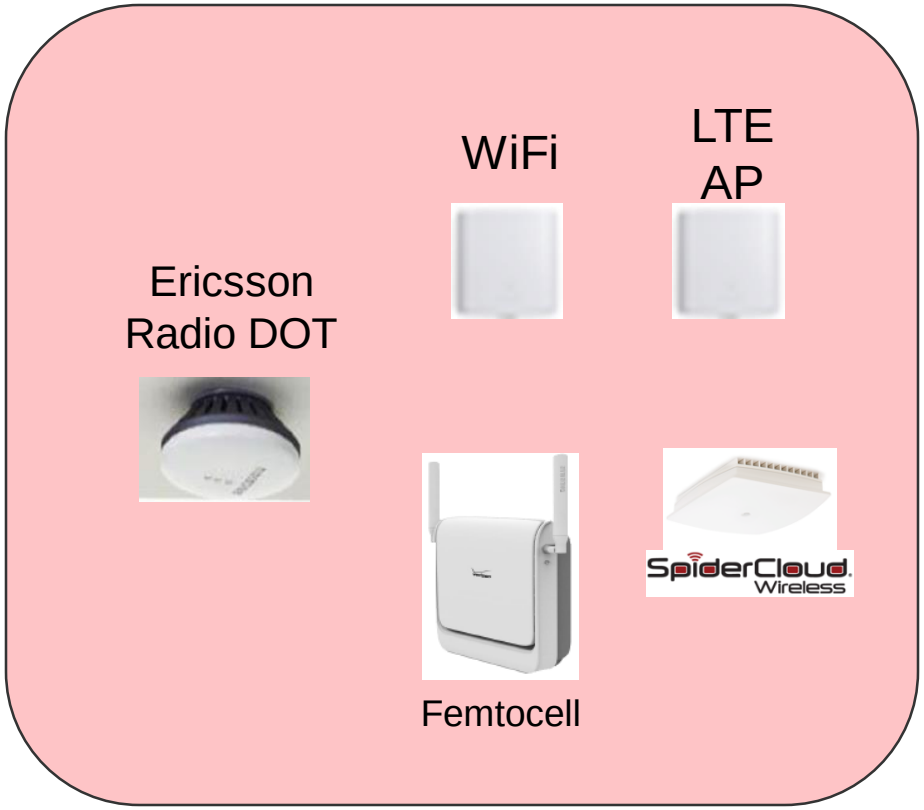
Newer solutions…

- Higher average SINR
- Macro capacity relief
- Simple site acquisition
- Lower cost
- Flexible backhaul – Good/Bad
- Limited/No Backup power



- **Potentially less reliable**

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Wireless Tool Kit Evolution*

Macro eNodeB

oDAS
iDAS

WiFi

Remote Radio

Ericsson
Radio DOT

LTE-U
AP

ADRF
Commscope
Corning Mobile Access
JMA – Teko
Solid

Femtocell

Micro
RRU/RRH

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Heterogeneous network challenges

Air interface standards are implemented differently

- UE power control
- Feature compatibility

Operational challenges are often overlooked

- Performance monitoring
- Unique deployment requirements
- Appear to operations teams as additional OEMs

The HetGen idea is simple but the reality is complex

- Requires integrating into complex core networks
- Feature availability and reliability are critical elements of the user experience

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Traditional business models are changing

This is just the beginning

- New solutions are need to be embraced
- Status quo is our foe

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America's Most Reliable 4G LTE Network.

- Simplify deployment and maintenance
- Challenge the status quo and deliver what the customer wants
- Maintain reliability for the customer and for the business

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America's Most Reliable 4G LTE Network.

- Leverage existing business relationships and products to meet enterprise objectives
- Advance open source SDN and NFV solutions based on open source SDN Network Operating System (ONOS) to help shape the future of the ecosystem
- Maintain network visibility and strengths to ensure HetGen solutions perform

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HUBER+SUHNER
Excellence in Connectivity Solutions

4.3 – 10 plus

Eliminating the 4.1-9.5 mating problem

- 4.1-9.5 mating proof
- Extended dielectric
- No new piece parts
- IEC compatible
- Can be used on all 4.3-10 female connectors
- Also available as adapter/port saver
- No influence on PIM
- Patent pending

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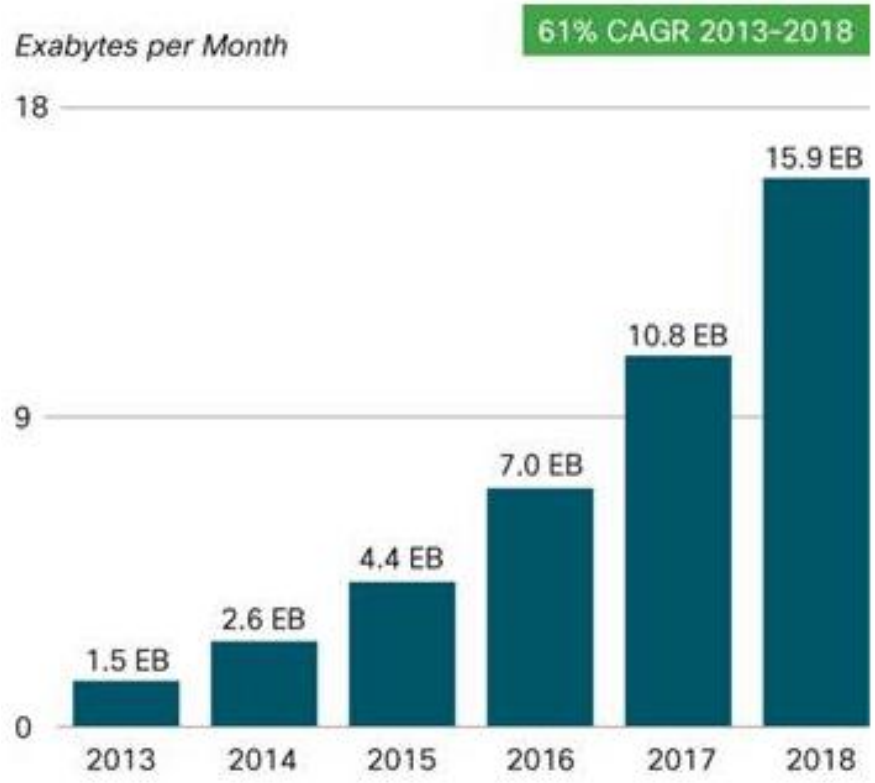
Questions?

Global Mobile Data Traffic Forecast



Source: Cisco VNI Mobile, 2014

New Devices, Pervasive Connectivity Driving Bandwidth Demand

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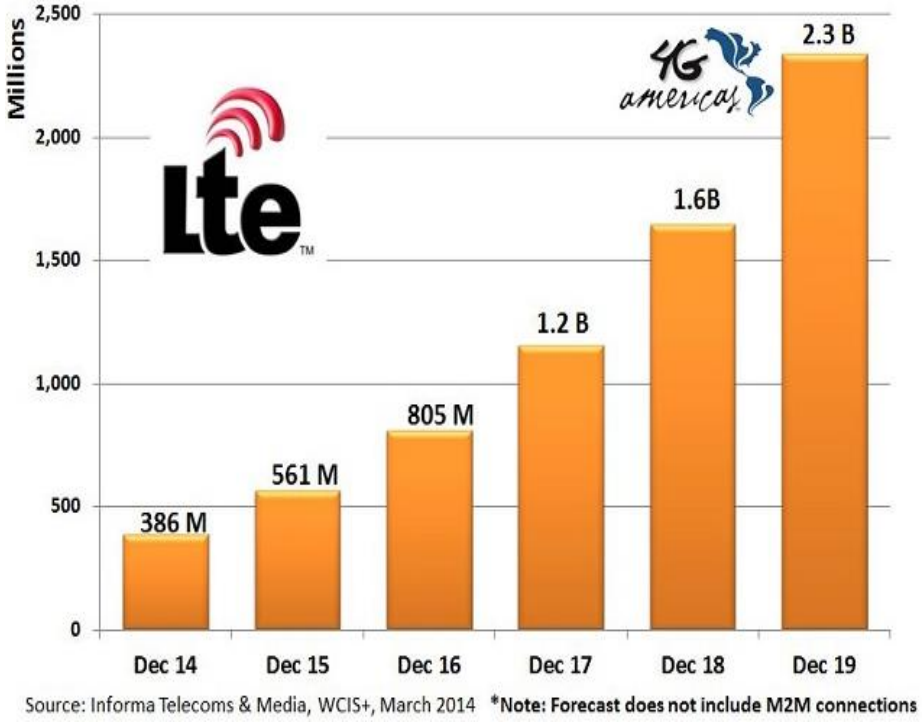
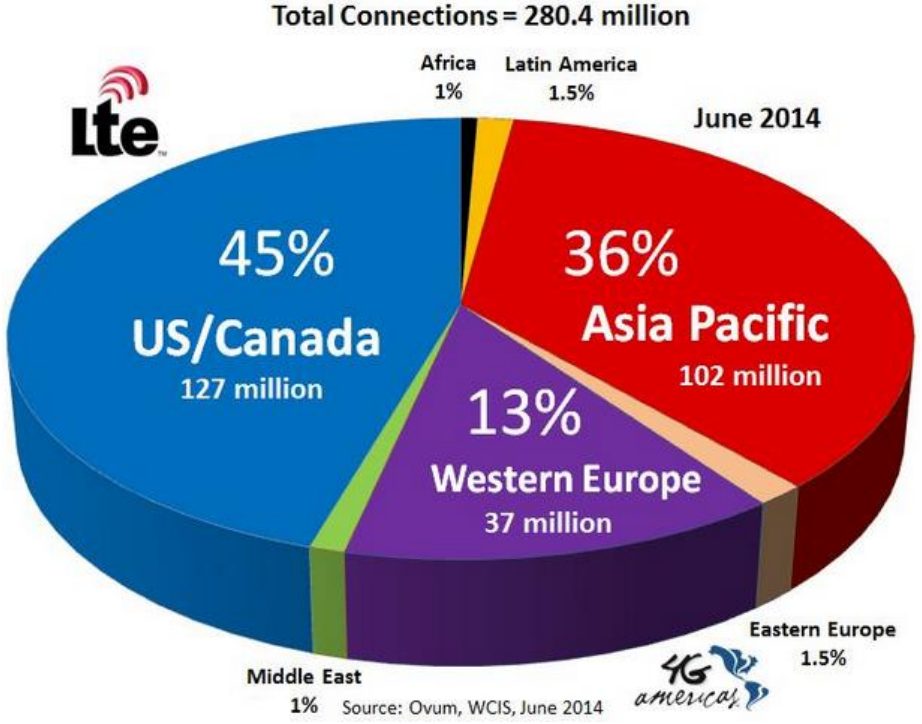
Global 4G LTE Growth

Global LTE Growth Forecast



Source: Informa Telecoms & Media, WCIS+, March 2014 *Note: Forecast does not include M2M connections

Global LTE Connections



Source: Ovum, WCIS, June 2014

393 commercial LTE networks worldwide across 138 countries as of April 9, 2015
644 operators in 181 countries are investing in LTE

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“What’s so great about Small Cells?”

- **Lessons learned**
  - The idea is easier than the solution
  - Backhaul is very expensive
  - Landlord expectations were macro based
- **Going forward**
  - Partner where there is opportunity
  - Develop new deployment models

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