Why LTE from Nokia Siemens Networks?

Tony Bell
Head of Mobile Broadband Solutions, US region
Nokia Siemens Networks
LTE market snapshot

- Devices
- Spectrum
- Subscribers

High-end smartphones
- Dual-core, HD-screen, LTE built-in
- Boosting LTE subscriber uptake in Korea, Japan, North America
- Introduced also in Europe and other markets

Tablets
- Launched in Japan, North America, Europe
- Samsung Galaxy Tab 8.9, Apple iPad

Dongles and routers
- Multinode (eGSM, LTE) and multiband dongles for mass-market transformation towards LTE
- Routers used for fixed broadband services

LTE subscribers as of March 2012
1. USA 7.8 million
2. Korea 3.6 million
3. Japan 2.3 million

Worldwide 13.15 million

Japan and Korea LTE(FDD) market presence

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<tr>
<th></th>
<th>docomo</th>
<th>Korea</th>
<th>LG U+</th>
<th>SK telecom</th>
<th>KT</th>
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<tbody>
<tr>
<td>Japan</td>
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<td>Korea</td>
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LTE front-runners in advanced markets define frequency band support by the devices

<table>
<thead>
<tr>
<th>Frequency bands</th>
<th>Examples of launched networks</th>
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<tbody>
<tr>
<td>2600MHz</td>
<td>SKY Subnet, NTT Docomo, KT</td>
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<tr>
<td>2600TD</td>
<td>LG Electronics, Samsung, LG U+</td>
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<tr>
<td>2500 TD</td>
<td>SK Telecom, LG Electronics</td>
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<td>2100</td>
<td>SK Telecom, LG Electronics</td>
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<td>1900</td>
<td>SK Telecom, LG Electronics</td>
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<tr>
<td>1800</td>
<td>SK Telecom, LG Electronics</td>
</tr>
<tr>
<td>1700/2100</td>
<td>AT&amp;T, T-Mobile, SK Telecom,</td>
</tr>
<tr>
<td>900</td>
<td>SK Telecom, LG Electronics</td>
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<td>850</td>
<td>SK Telecom, LG Electronics</td>
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<td>800</td>
<td>SK Telecom, LG Electronics</td>
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<tr>
<td>700</td>
<td>SK Telecom, LG Electronics</td>
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Note: LTE bands 2 and 4 not available in the US.
4 Great reasons for LTE radio access from Nokia Siemens Networks

- Commercially proven
- Superior performance
- Unlimited power with Liquid Radio
- Outperforms TCO targets
Nokia Siemens Networks - leading the LTE market with 56 commercial LTE customers

- 50 LTE radio deals (incl. 6 TD-LTE)
- 28 LTE EPC deals
- 27 commercially launched networks (incl. 4 TD-LTE)
Delivering LTE performance on all bands

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<tr>
<td>2600MHz</td>
<td>Telia, emt, Sonera</td>
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<td>T-Mobile, KT</td>
<td>✓</td>
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<tr>
<td>1600 (L-band)</td>
<td>LG U+, Deutsche, Telefónica, Telia</td>
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<tr>
<td>850</td>
<td>SK Telecom</td>
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Largest LTE on 800MHz deployment

“Nokia Siemens Networks has already demonstrated its **technological leadership in LTE. In addition its expertise in services has convinced us: It can ensure the rapid, high quality network roll-out we want and have planned.” Bruno Jacobfeuerborn, Director Technology Telekom Deutschland

1800MHz GSM/LTE

World’s largest GSM/LTE concurrent mode deployment by Nokia Siemens Networks in Telia Denmark

Only vendor with 3 large scale TD-LTE trials in China

Sept. 13, 2011 Commercial launch of TD-LTE network

Hangzhou Xiamen Guangzhou
Ready to ensure user experience when traffic grows?

Commercially proven?

Superior performance?

Technologically ahead?

TCO targets?
Capacity for more paying users

“Best broadband user experience”
- 40…80% higher throughput
- 12 times more users
- Extended QoS differentiation

Consistently better user experience

Cell edge performance boost

Extended QoS

Monetize services and retain the most valuable customers

Cell edge performance boost

Extended QoS

Consistently better user experience

“…as the detailed results in this report confirm, the overall performance of the Gothenburg network (NSN) was better than the performance of the Stockholm network (ERICY)” 9/2010


Proven superior performance

Higher average throughput

Consistently lower latency

Higher average throughput

Consistently lower latency

Smart Scheduler continuously getting smarter

Highest average throughput

Superior Performance

Monetize services and retain the most valuable customers

Consistently better user experience

Cell edge performance boost

Extended QoS

Proven superior performance

Higher average throughput

Consistently lower latency

Higher average throughput

Smart Scheduler continuously getting smarter

Nokia Siemens Networks 2012
Smart Scheduler
Track record in delivering higher throughput and lower latency

2010, Sweden
What: More simultaneous users, higher data rates
Why: More effective radio resource allocation to multiple users

2011, Korea
What: 50% lower average latency
Why: Proactive resource allocation and fewer retransmissions

2011, Korea
What: 88% higher average throughput
Why: Efficient adaptation to good and bad radio conditions

2012
What: Up to 40% higher cell edge data rates in uplink
Why: Interference awareness

Other vendor
Consistently higher throughput and lower latency

Throughput:
88% better on average than vendor C

Latency:
Even worst measurement better than average latency of vendor C

Drive test throughput in Mbps
10MHz bandwidth on 850MHz band

Average throughput  Peak throughput

+ 88%  + 24%

18  25  34  61  58  72

Nokia Siemens Networks  Vendor B  Vendor C

Drive test latency measurements
10MHz bandwidth on 850MHz band

• average latency:  27ms  
• worst measurement: 51ms

Vendor B
• average latency:  38ms
• worst measurement: 322ms

Vendor C
• average latency:  53ms
• worst measurement: 360ms

Drive tests performed by Nokia Siemens Networks (Oct. 2011)
The future changes every day. Are you prepared?

Commercially proven?

Superior performance?

Unleash frozen network capacity

Technologically ahead?

TCO targets?
Keeps your network one step ahead

- **Liquid Radio** for maximum flexibility and efficiency
- Software defined radio
- 2G, 3G, LTE, TD-LTE, LTE-A
- **Flexi Zone** for small cell clusters

- **World’s first** dynamic LTE-Advanced carrier aggregation on commercial HW
- **World’s first** demonstration of data rates exceeding 1.4Gbps on 100MHz of spectrum on commercial HW
Innovation - Liquid Radio enables next generation networks

**Liquid Radio**

- **Real Active Antennas**
  - Flexi Multiradio Antenna System
  - Up to 65% more capacity
  - More technologies – same space

- **Single RAN Advanced**
  - LTE-Advanced
  - LTE, TD-LTE
  - WCDMA, HSPA+
  - GSM
  - Unique pooling concept
  - 1 baseband – 4 technologies

- **10 Gbps per Basestation**
  - Flexi Multiradio System Module
  - Truly scalable capacity
  - 100% future-proof towards LTE-A

- **Integrated Transport**
  - No external units needed
  - All-in-one concept for MW & fixed

- **Compact single-box BTS**
  - Flexi Lite BTS
  - Efficient additional capacity/coverage
  - Micro and pico deployment
Innovation - Flexi Zone
Delivering Capacity & Lowest TCO in Hot Zones
with New Liquid Radio Small Cell Architecture

LTE/3G & WiFi Underlay Pico Cluster

- Local Offload of Low Value Traffic Slashing Transport / EPC Costs
- Highly Scalable Capacity for Best sub XP with up to 1000 AP per Zone
- Coordination & Interference management for Improved RF performance
- Solves Small Cell Backhaul Challenges for Strategic placement deep in Hot Zone
- Lowest TCO with Install & Operation Paradigm Shift

Public Hot Zone
TCO or true total cost control?

- Commercially proven?
- Superior performance?
- Technologically ahead?
- TCO targets?
TCO - best in class efficiency

Saves more money than any other BTS
- Most cost-efficient network
- Award-winning OPEX saver
- Less field service & site rent cost

"NSN reduces our risk. It’s easier to use NSN for LTE. All we have to do is change the software in the base station and compress voice traffic."
Mock Pak Lum, head of infrastructure at StarHub.

Outperforms TCO targets
- Lowest power consumption
- Full utilisation of cheap IP
- Less site visits required
- Software-defined radio
- Smallest footprint

TCO 10 years

CAPEX in RfQ + Power consumption + Transport + Field service + Cost for Upgrades + Site rent
TCO - 12x more traffic per m², 80% more capacity per site

Ready for compact baseband farms

Liquid Radio

Unique baseband integration density and scalability

12x more traffic per m²

6 sector site trial results
• Downlink capacity: +88%
• Uplink capacity: +67%
• Instantaneous user throughput: +100%

Outperforms TCO targets

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LTE radio access from Nokia Siemens Networks
Analyst views – not just patting our own back!
Nokia Siemens Networks LTE Analyst evaluations

“Considering changes in this matrix since its last 2011 edition, ABI Research believes that Nokia Siemens Networks retains the overall #1 position, thanks to the number of contracts it has won and innovation in the small cell area.”

Nick Marshall, Aditya Kaul, ABI research, March 2012
The LTE Base Station Market

- “Flexi family of base stations is threatening to the competition”
- “Flexi Multiradio and Multiradio 10 are unique in their use of modules”
- “This architecture gives the company the ability to scale an operator’s network capacity in close coordination with each network’s specific capacity needs.”

Ed Gubbins, Current Analysis, February 9, 2012: LTE eNodeB, Nokia Siemens Networks – Flexi BTS Family
Thank you…

for a world in motion™