3GPP TSG RAN workshop on REL-12 and onwards RWS-120004
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LTE Evolving Towards Local Area in Release 12 and Beyond

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Drivers for Release 12 LTE Evolution

Requirements

- Extreme Capacity Needs
- Efficient Spectrum Usage
- Cost and Complexity Efficient
  "Make it simple"
- Flexibility
  "Manage variety of traffic, device types and deployments"
- Offloading from Macro

Drivers

- Smart Device
  User Experience
  "We want more and faster"
- Always connected
  "Content in the cloud"
- Affordable broadband available always and everywhere
- Power efficiency
- Awareness of local services and related optimised access

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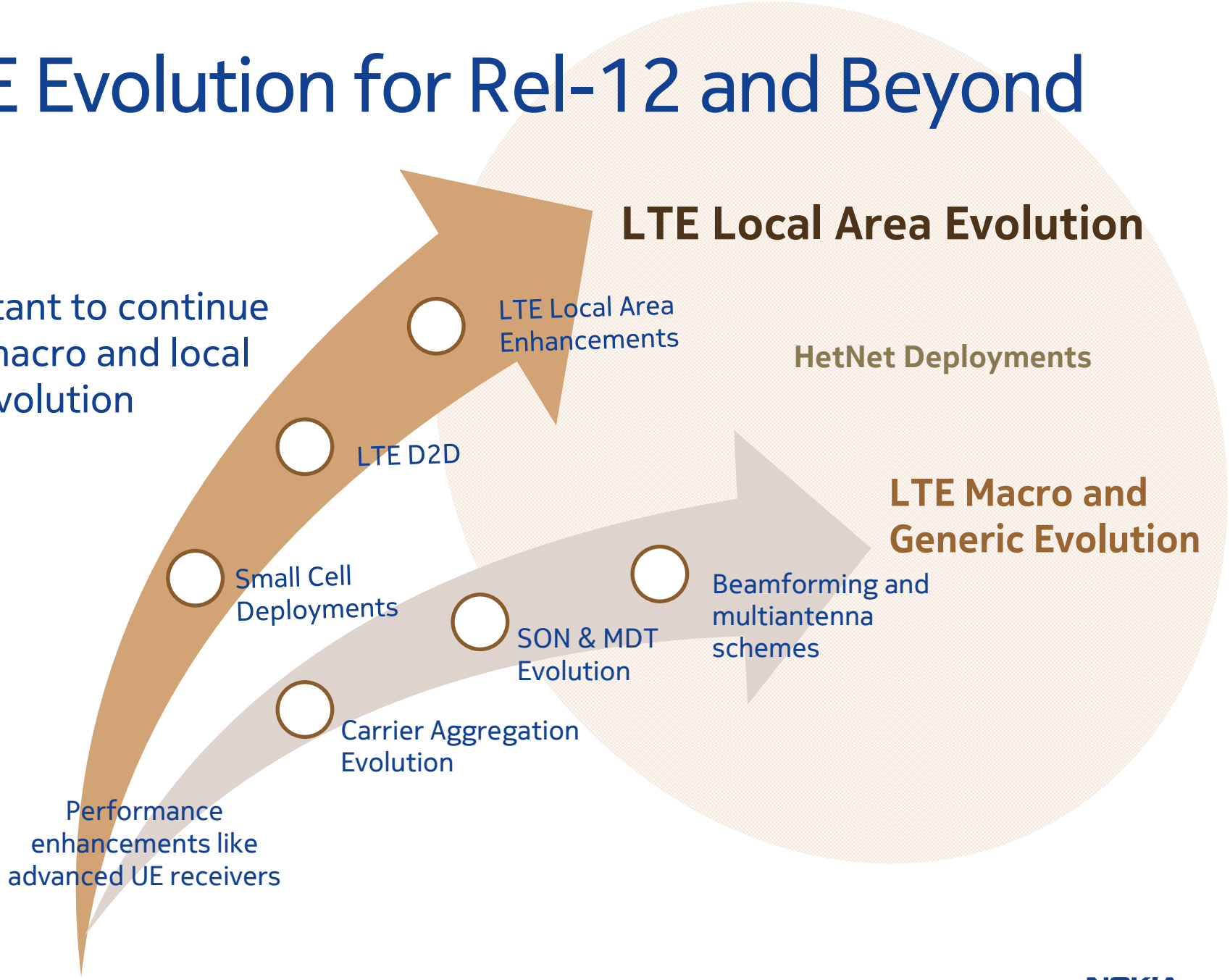
LTE Evolution for Rel-12 and Beyond



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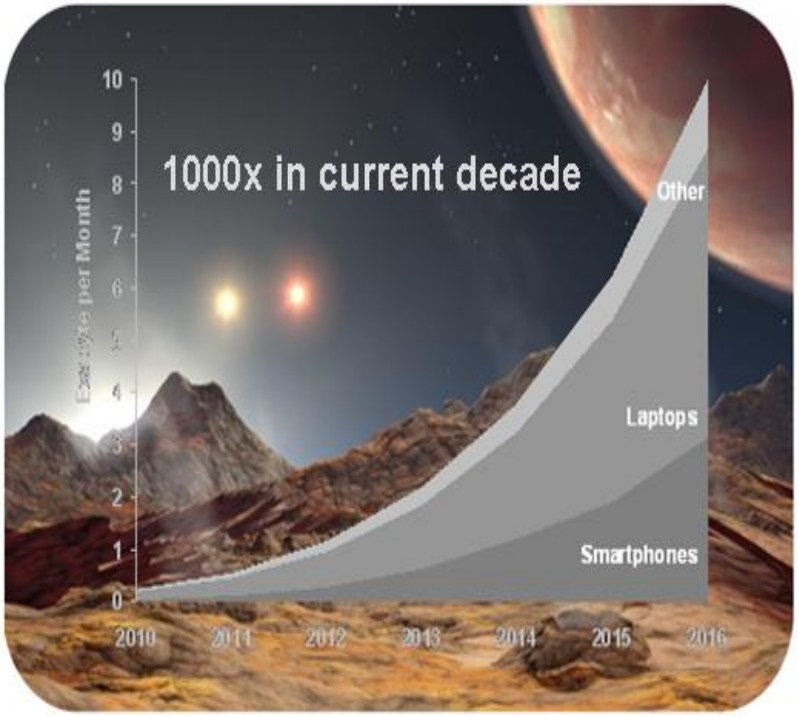
Increasing Capacity Needs – “more and faster”



Content in the cloud

… my latest videos uploaded…

Data consumption behaviour has changed… UL capacity needs increase noticeably

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LTE in Local Area Deployments & Enhancements

Small cell deployments are increasing and it is thus relevant to optimize LTE system for such scenarios

Opportunities in Local Area:

Better fitting of LTE small cells into the existing ICT-infrastructures (e.g. Corporate LANs and Intranets) to support business and local services

Provision of offloading from macro and capacity extension with LTE small cells

Performance enhancements specific for local area

- Higher data rates (especially typical)
- Increased capacity
- Optimized mobility
- Interference coordination

Important factors:

Reduce impact on dynamics of macro networks due to small cells (e.g. handovers)

Avoid significant CN impact when increasing number of small cells

Preserve EPC security

Further drivers:

Cost competitiveness
Device Power efficiency
NW Energy efficiency

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LTE Local Area Enhancements

- Macro cells for coverage and **small cells for offloading**
- Local area deployments for improving **capacity and user experience** - "more and faster"
- For optimized LTE small cell deployments **separate and potentially also somewhat higher frequency band could be considered**

- **Two high level approaches** for LTE local area enhancements can be identified;
  - **Stand-alone LTE local area frequency layer and local area enhancements** – LTE macro cell present but no assistance assumed
  - **Macro assisted local area deployments and enhancements** – LTE macro cell present and assistance assumed
    - This may comprise stand-alone operations for local area

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Energy Efficient Local Area Deployments

Device power efficiency is essential for successful LTE local area enhancements

- Trade-off analyses between different LTE local area enhancement approaches is important

Reduced total energy consumption of cellular networks and billions of devices connected is an important factor in LTE local area enhancements

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LTE Local Area Enhancement Areas

Study pros and cons in order to identify local area enhancement roadmap for Release 12 and Beyond

Enhancement and simplifications areas	Potential Study Topics
LTE Physical Layer Enhancements	Backwards compatible UL evolutionary steps vs. UL OFDMA, DL 256QAM, ICIC for small cells
LTE Protocol Enhancements	Mobility optimizations and efficiently offloading mechanisms towards small cells
Architecture Enhancements and Simplifications	Architecture simplification e.g. for avoiding CN impacts due to large number of small cells
UE and BS Requirements	RF requirement relaxations for cost and complexity optimizations when co-existence studies enable that

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LTE Device to Device - Proximity Based Services

LTE D2D discovery provides **new service opportunies and stronger social presence to LTE**

LTE D2D direct communication with network and operator control enables better user experience for certain applications and even offloading from macro e.g. in case no lower power nodes are available on given "hot spot" frequency layer

Discover and interact with your friends in close proximity. Exchange content like photos and videos with your friends nearby

Discovery is first enabler for new services
Direct Data communications to extend LTE D2D even further

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Getting Ready for Release 12

Verify Release 11 completion status, needs for further evolution of Release 11 topics and then plan new Release 12 topics

What is really essential?

Avoid unnecessary complexity by number of options or nice to have features

Consider use cases carefully; what makes sense in local area does not necessarily make sense in macro and vice versa

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Thank You!

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