



3GPP TSG RAN workshop on REL-12 and onwards, Ljubljana, Slovenia, June 11-12, 2012



## Release 12 for C<sup>4</sup> (Cost, Coverage, Coordination with small cells and Capacity)

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# Outline

What drives LTE network evolution

Which areas of LTE to improve?

HSPA Release 12 and beyond

Summary



# Three cornerstones driving network evolution



## Eager & expectant customers

*People are hungry for new applications and having quite strong expectations on usability and quality*



## New services & applications

*Immense augmented real-time interaction, amazing user interfaces, smart objects and smart devices*



## A platform for everything

*Unlimited cloud resources, broadband connectivity everywhere and huge variety of smart devices build an universal platform*

People – Applications - Platforms

# LTE Release 12 and beyond

## LTE Release 12

- Capacity enhancements
- Efficient use of network resources with HetNet & multi-technology deployments
- Minimize network cost and maximize cell edge performance

Coverage and Capacity  
3D-Beamforming & LTE/HSDPA CA

Cost  
SON & Off-loading & Energy Efficiency

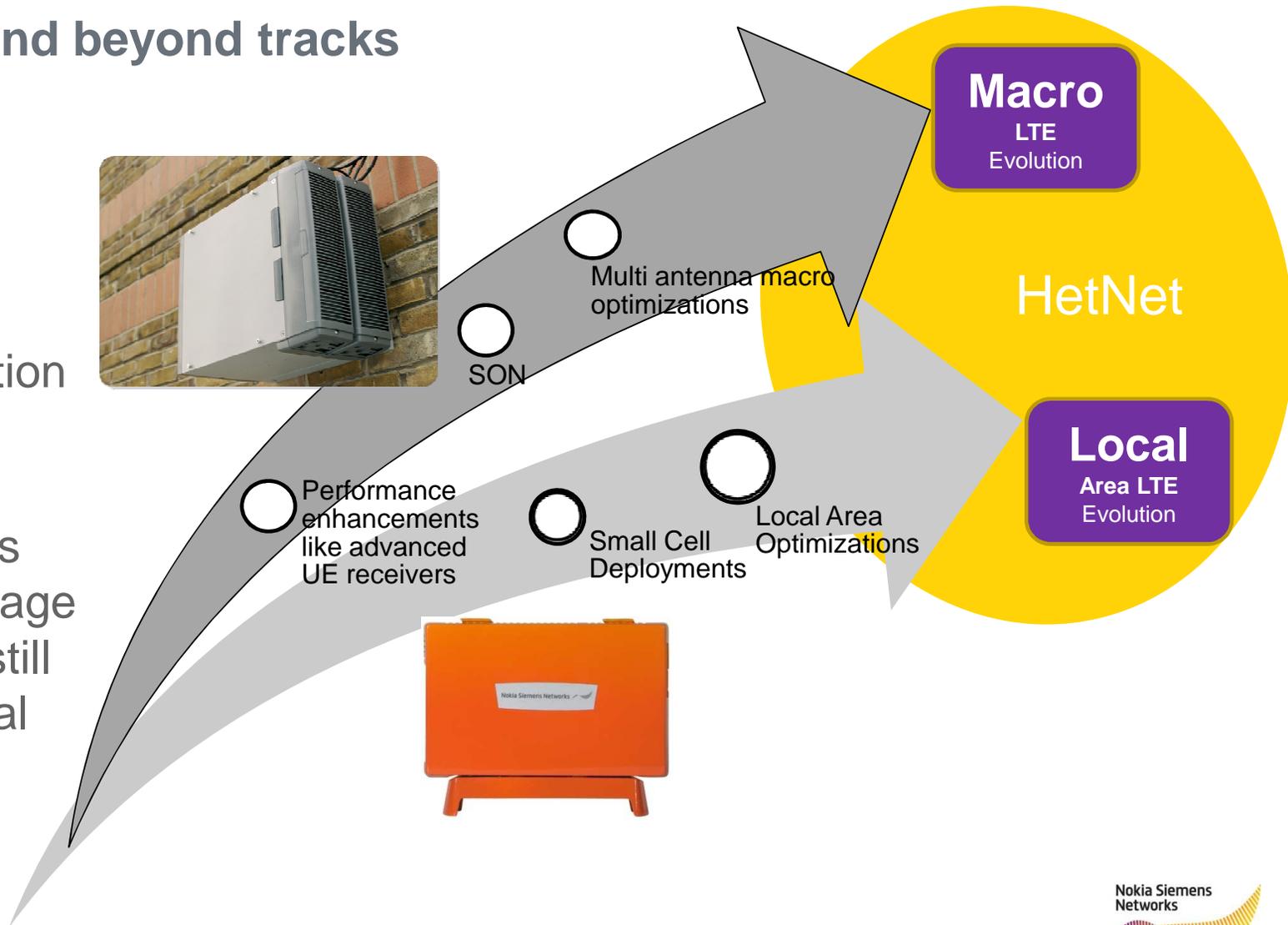
Coordination with Small Cells  
LTE Multiflow for Liquid Cells

Cost  
LTE Optimization for Smartphones

Extending LTE market  
LTE for Public Safety

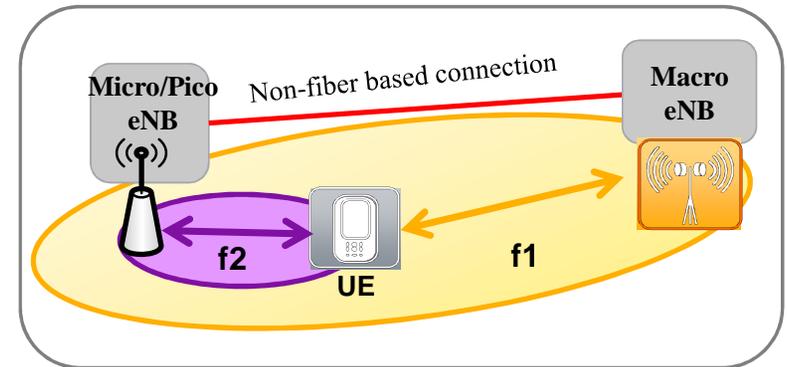
# LTE Release 12 and beyond tracks

- Important to continue both macro area and local area evolution
- Traffic increase needs small cells but macro coverage & performance still remains essential



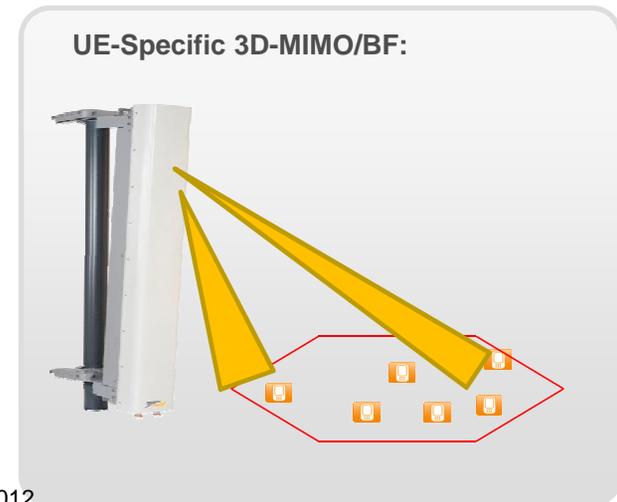
## LTE multiflow / Inter-site CA

- Consider to support inter-site CA schemes with relaxed /reasonable backhaul requirements (delay > 1ms)
- Similarity to HSPA multiflow
- Drivers in HetNet scenarios:
  - **Dynamic multi-layer traffic steering/offloading:** To facilitate “seamless” mobility between macro and pico layers
  - **Enhanced mobility:** Reduced handover overhead, increased mobility robustness, less loading to the core network
  - **Improved capacity:** Increased user throughput with carrier aggregation or by selecting the best cell for uplink and downlink



## 3D-beamforming

- Beamforming can utilize also the vertical domain by vertical sectorization, reaching capacity improvement over the traditional sectorization solution
- For more complicated scenarios (including beyond 8 antenna ports) Release 11 baseline should be investigated together with an appropriate 3D-channel model
- Outcome of the study is to determine potential feedback enhancements in LTE specifications



# SON Evolution

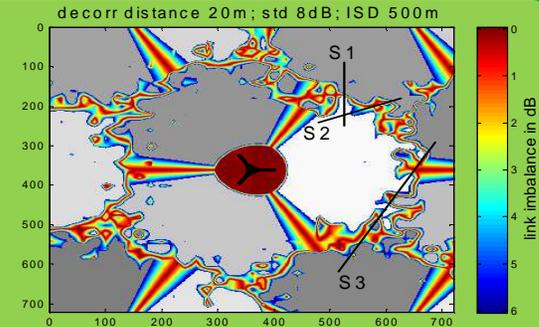
## SON for UE groups/ configurations

- SON use cases can be enhanced to treat differently UE groups / configurations, high/low speed UEs, Release 8 UEs, CA UEs, EDDA UEs, MTC UEs etc

## SON to leverage UE position information

- Propagation and interference make cell borders complex and overlap region can vary greatly

Addition of position information to SON allows optimized HO thresholds along cells



## SON for AAS and dynamic spectrum allocation

- SON can automate the optimization of the spectrum use
- SON can use AAS to adapt coverage according to actual traffic and user demands.
- SON can optimize spectrum allocation between different RATs.



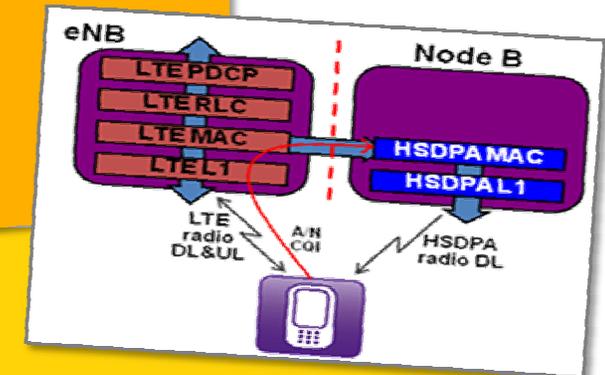
## SON for HetNet and small cell deployment

- SON is also the enabler for cost efficient small cell deployments.

# LTE/HSDPA Carrier Aggregation

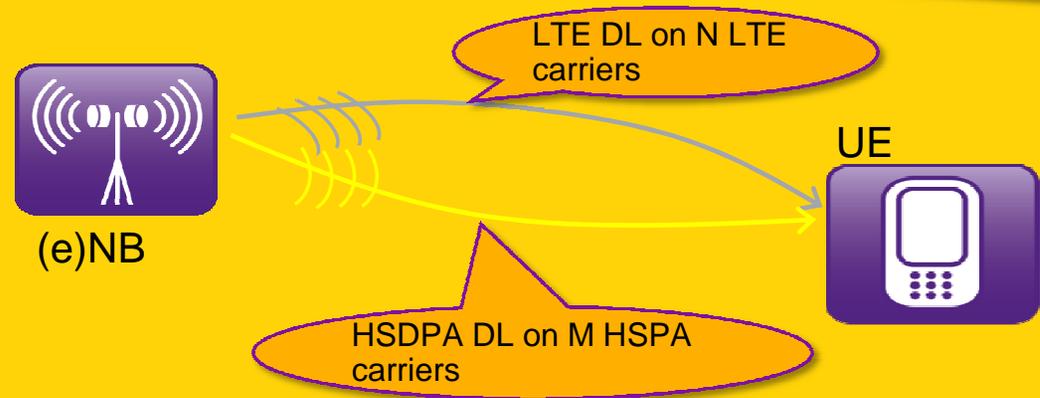
## Motivation:

- Capacity and end user experience
- Load balancing to deal with bursty traffic
- The same benefits as with the LTE-Carrier Aggregation



## Extend the existing LTE CA framework to support LTE/HSDPA CA

- Similar gain mechanism as with LTE Carrier Aggregation
- Single uplink (LTE) to avoid co-existence issues and for better uplink coverage
- HSDPA feedback delivered over LTE uplink



## Potential Rel. 12 Topics

### HSPA Release 12

- Capacity enhancements
- Efficient use of network resources under changing load
- Better tailored towards the signaling needs of tomorrow's applications

Capacity and Coverage  
Boosting HSUPA

Coordination with Small Cells  
Efficient HetNet & Offloading

Coverage  
Multiflow Enhancements

Cost  
HSPA Optimization for Smartphones

# Multiflow Enhancements

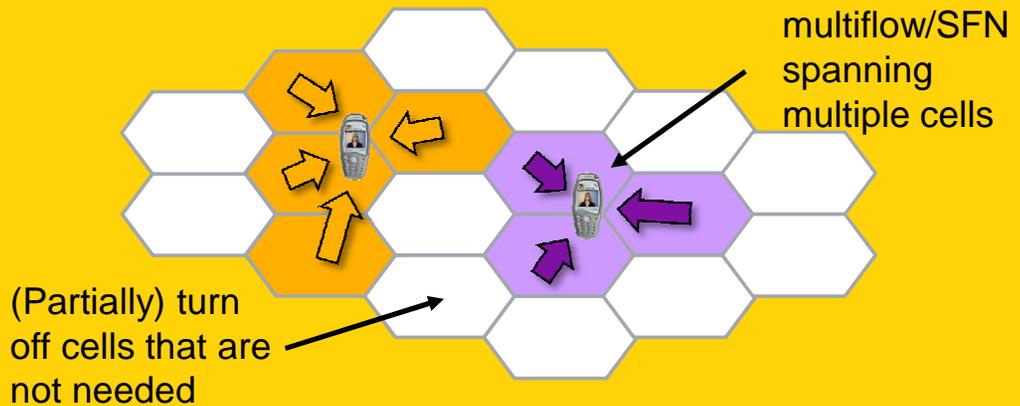
## Motivation:

- System load fluctuating strongly in time and space -> direct capacity where it is most needed

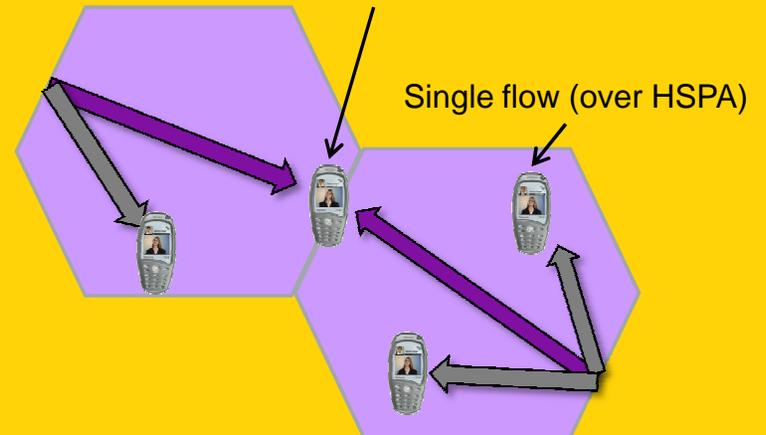
## Motivation:

- HSPA cell edge performance improves with Multiflow -> enable the same improvement for Speech over HSPA, especially after VoLTE handover to 3G
- Finally, remove Rel-99 DCH since it does not support advanced features, such as CPC or advanced UE receivers

Use liquid cells, which adjusts to the system load and enable to



## Multiflow + Bicasting/Flow Switching (\*)



(\* Potentially already part of Rel.11 MF)

# Summary

- Improve LTE cost, coverage and capacity
- Improve operation in HetNet and multi-technology environment
- Continue HSPA evolution

## LTE Evolution

Continuation from Release 11

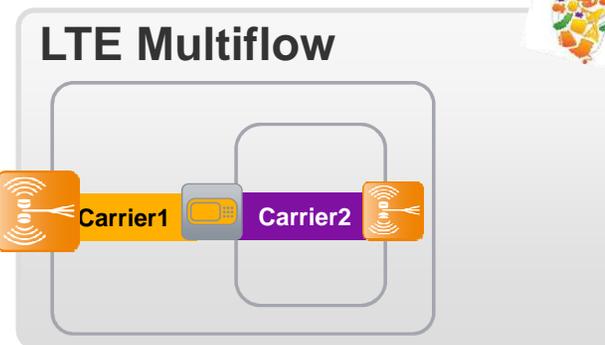


## 3D Beamforming

Leveraging UE specific beamforming



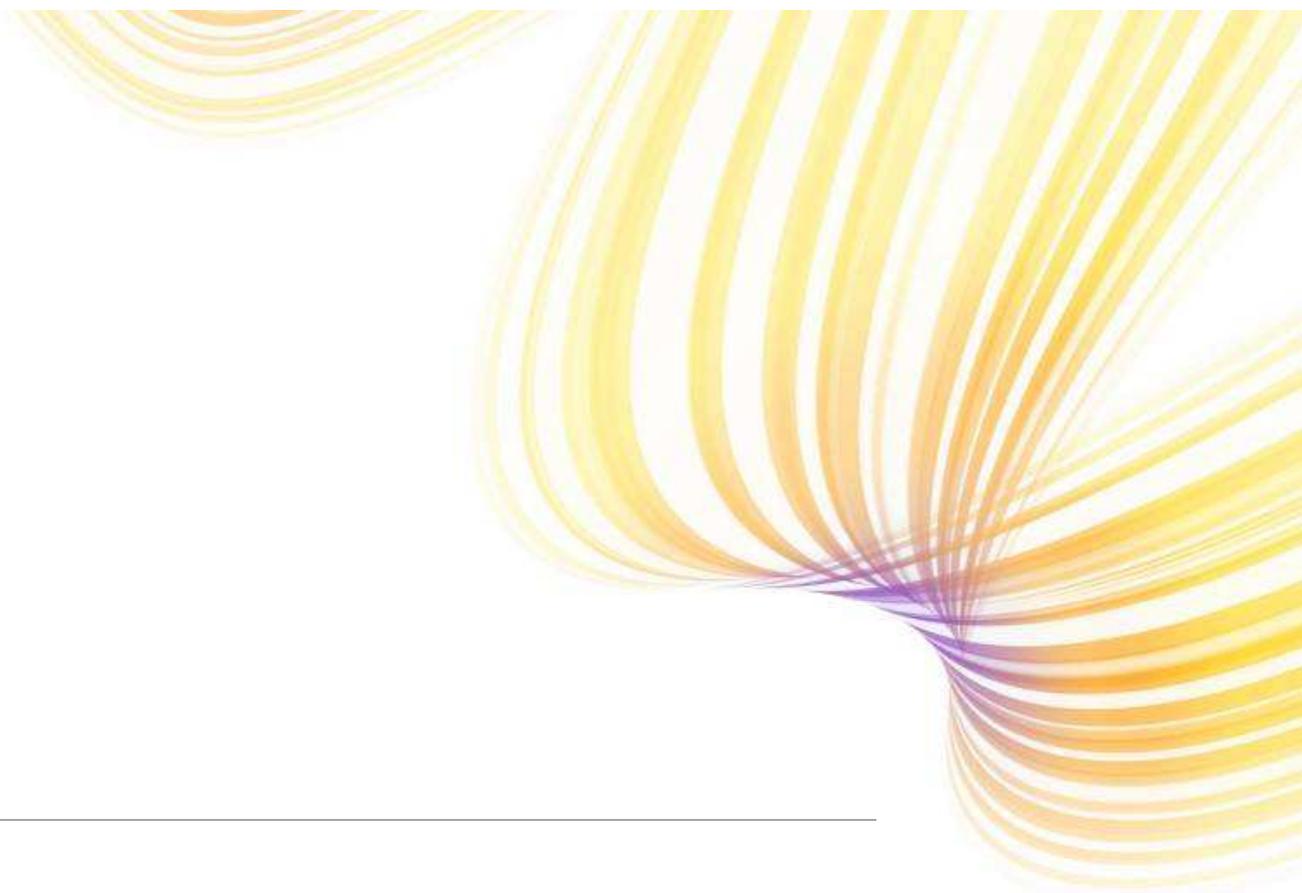
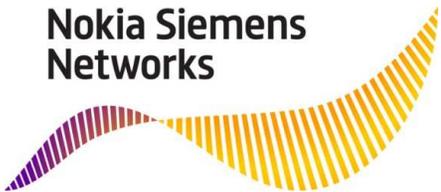
## LTE Multiflow



## HSPA Evolution

Uplink capacity  
Multiflow enhancements  
Optimization for smartphones  
HetNet  
Aggregate with LTE

Nokia Siemens  
Networks



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Thank You