



ERICSSON

# HETEGORÉN HÁLÓZATOK KIALAKULÁSA ÉS FEJLŐDÉSE

Kaszás Gábor  
Ericsson Magyarország



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# AGENDA

- › Introduction
- › Making the right choices
- › The toolbox
- › Small Cell experiences
- › Summary



# WHAT IS A HETEROGENEOUS NETWORK?

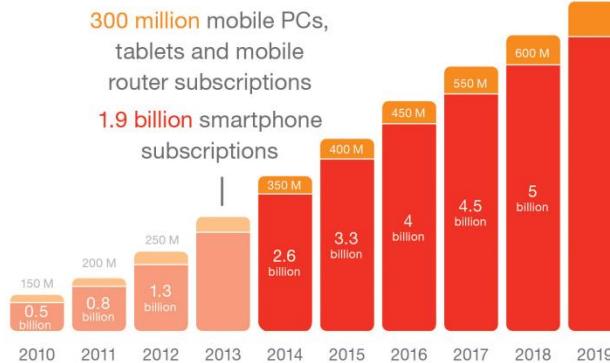


# DRIVERS FOR NETWORK CHANGE



## Mobile Broadband subscriptions over the world

Smartphones, mobile PCs, tablets and mobile routers with cellular connection

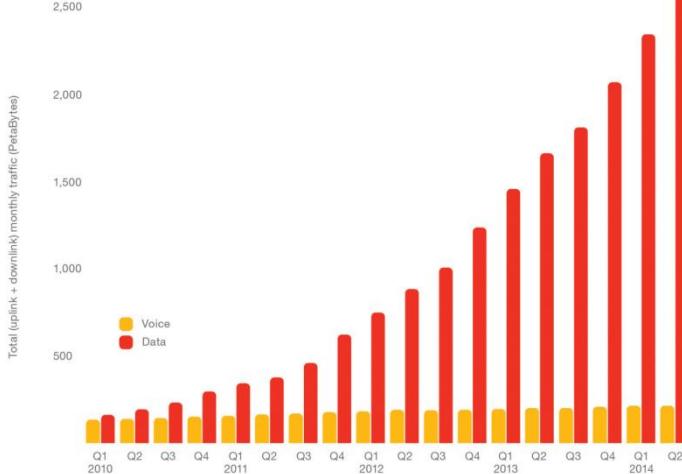


700 million mobile PCs,  
tablets and mobile  
router subscriptions

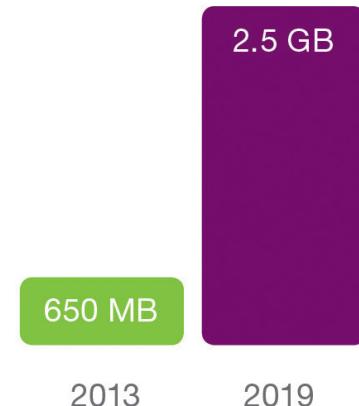
**5.6 BILLION**  
**smartphone subscriptions**  
by the end of 2019

Mobile PCs, tablets and mobile router subscriptions  
Smartphone subscriptions

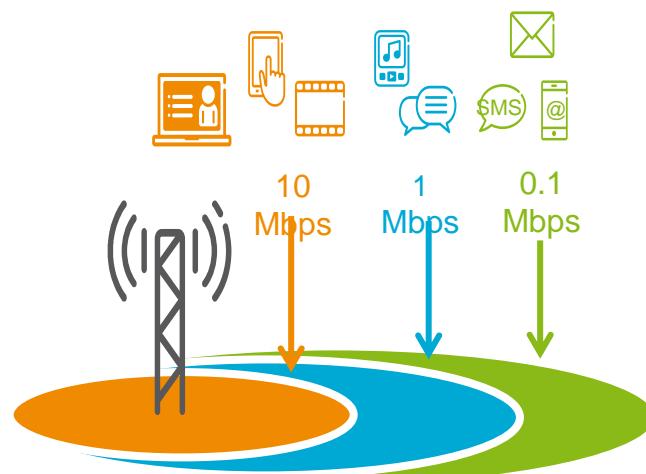
## Mobile Broadband data traffic worldwide



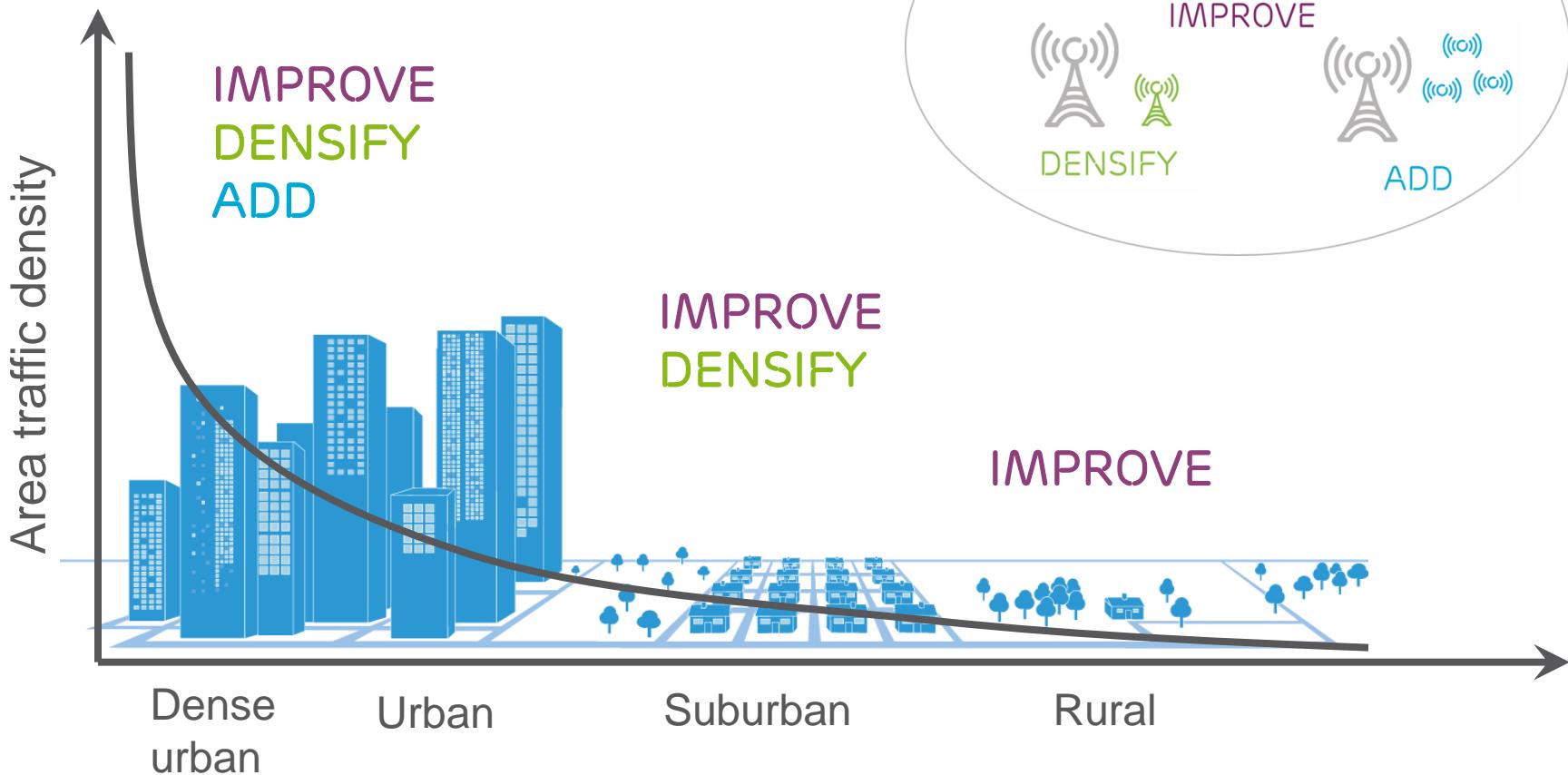
## Mobile Traffic per active subscription per month



## Application coverage



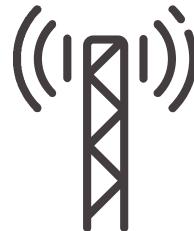
# MAKING THE RIGHT CHOICES



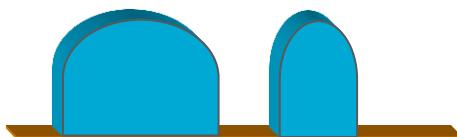
# FIRST STEP - IMPROVE MACRO



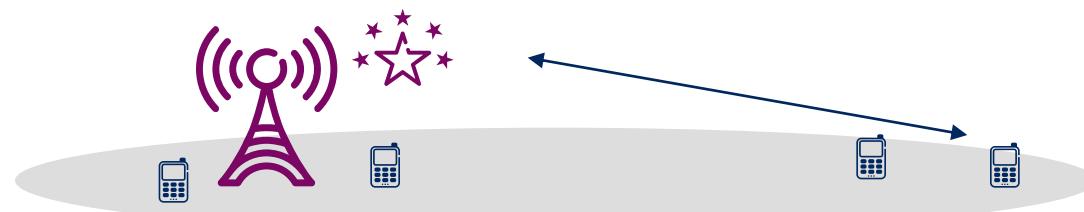
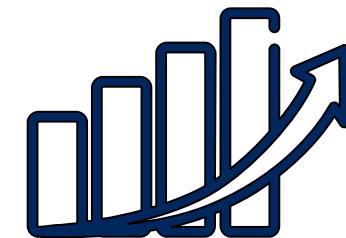
Improve radio/antennas



Add spectrum

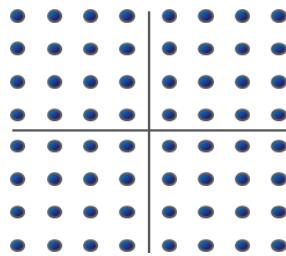


Performance features



# MACRO IMPROVEMENT

## COVERAGE AND CAPACITY



Higher order modulation



Advanced receivers

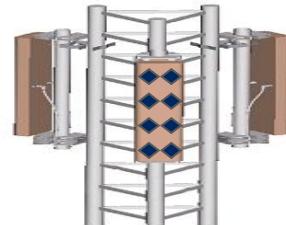
Antenna-integrated radio



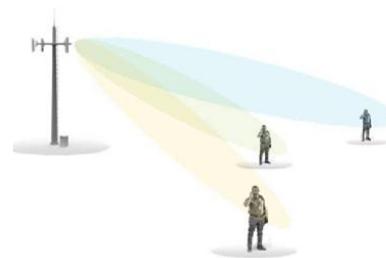
Increased sectorization



Adding spectrum  
Carrier aggregation

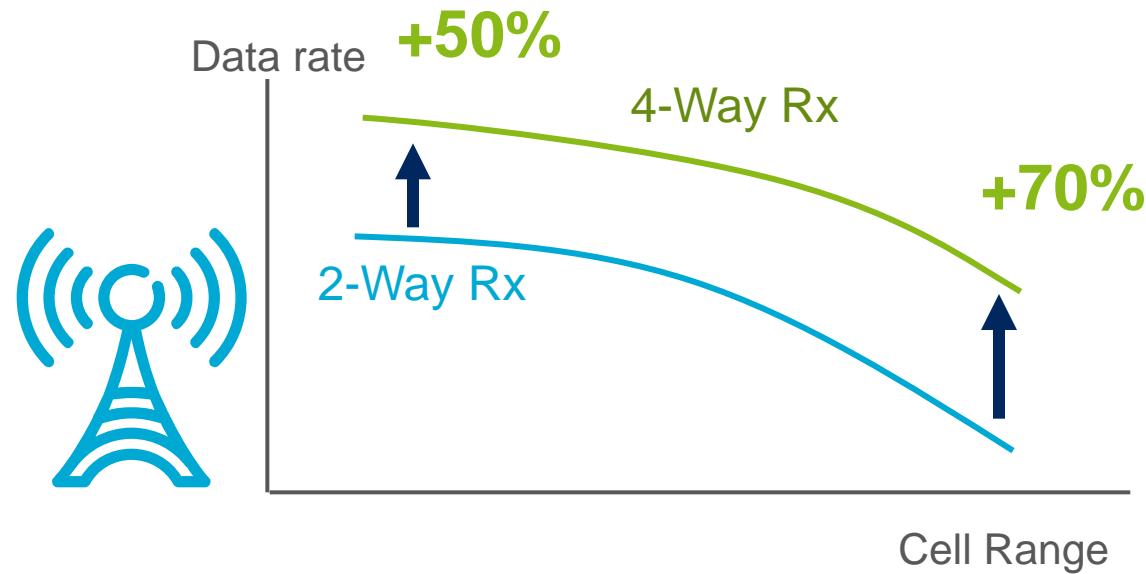


Four-way receiver diversity



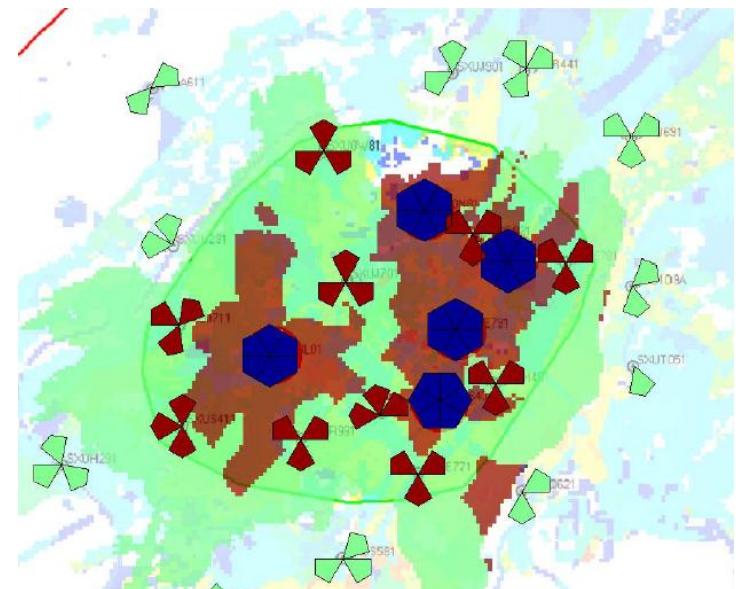
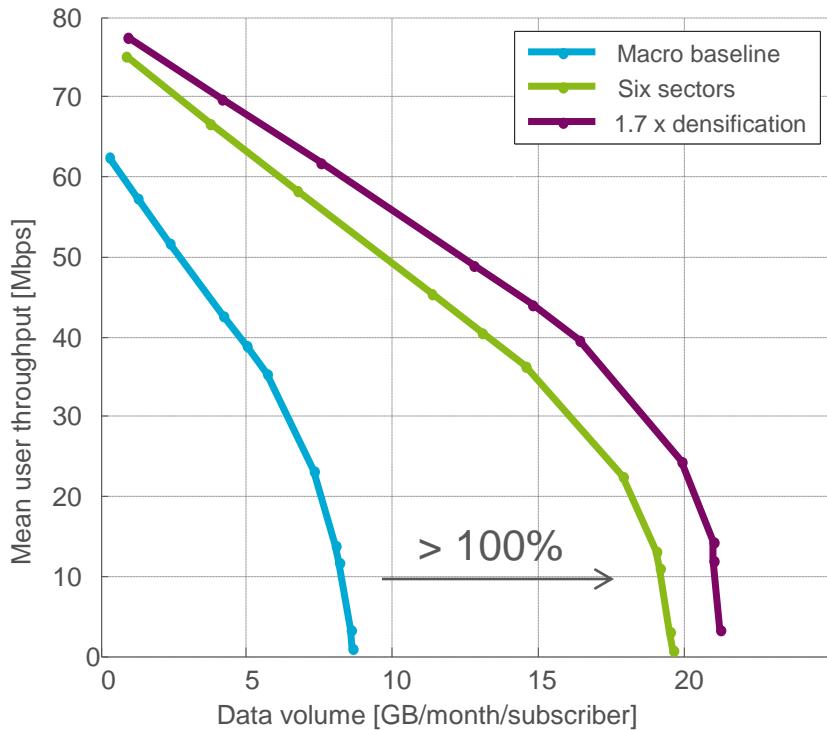
Beam forming

# FOUR-WAY RECEIVER DIVERSITY



Increase Uplink throughput

# HIGHER ORDER SECTORIZATION



Increase Network Capacity

# DENSIFY MACRO

- › HSPA and LTE are proven to excel in macro networks below 200 m inter-site distance
- › Most networks benefit greatly from macro densification

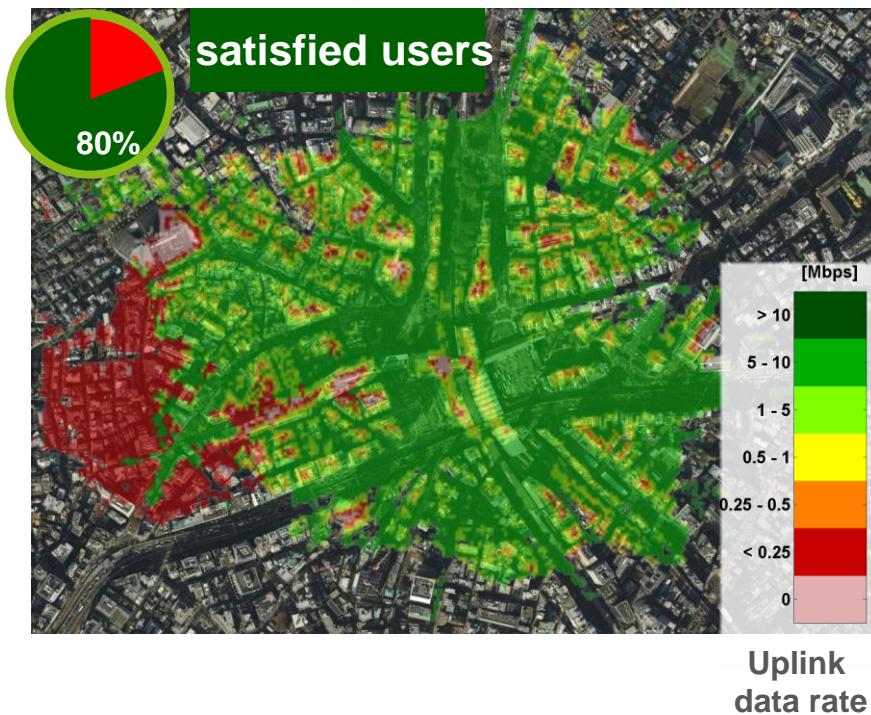


# URBAN MACRO DENSIFICATION

## - LTE CASE STUDY



Dense macro, inter-site distance 250 m



Densified to inter-site distance 200 m

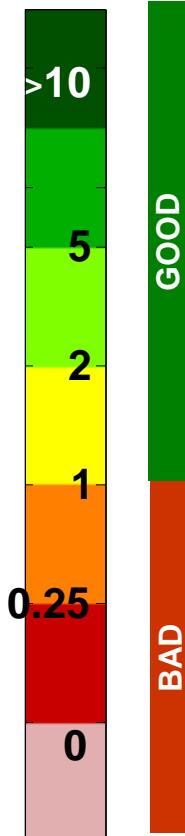


# SUBURBAN MACRO DENSIFICATION

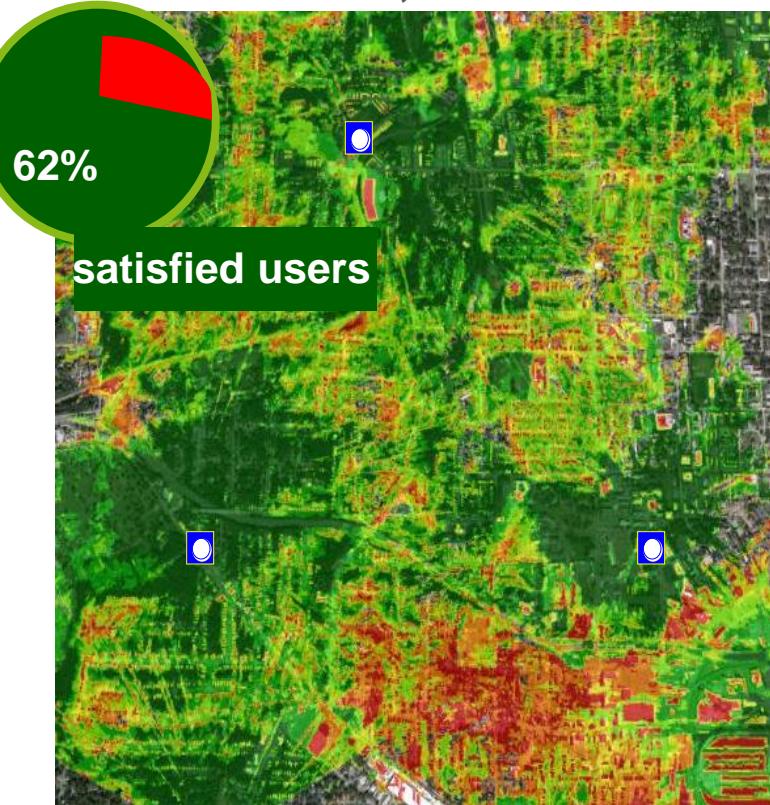
## - LTE CASE STUDY



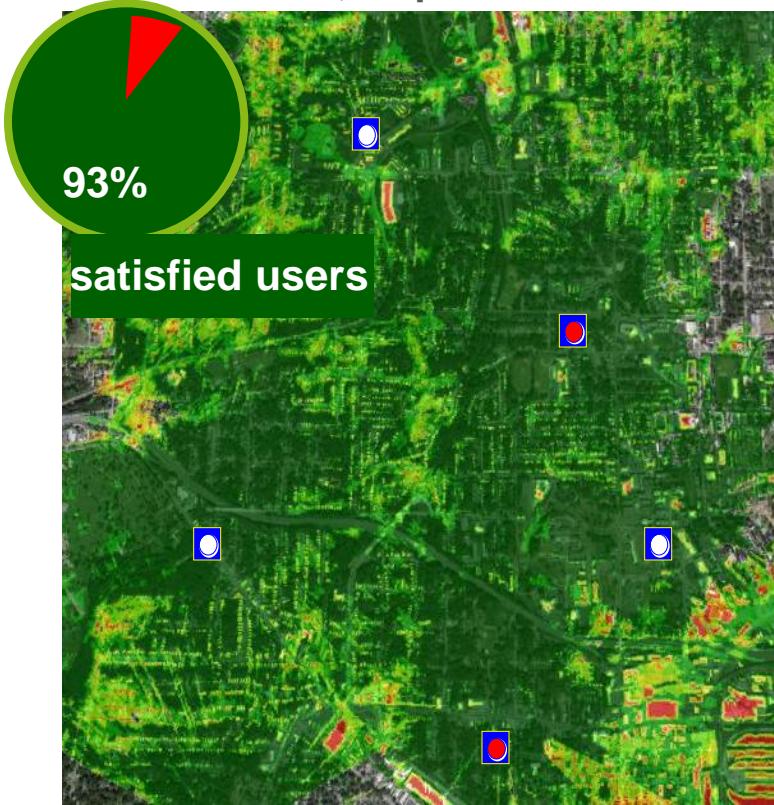
Uplink  
data rate  
[Mbps]



Macro baseline, 2–3 km site-to-site



Densified, 46 percent more sites



62%

satisfied users

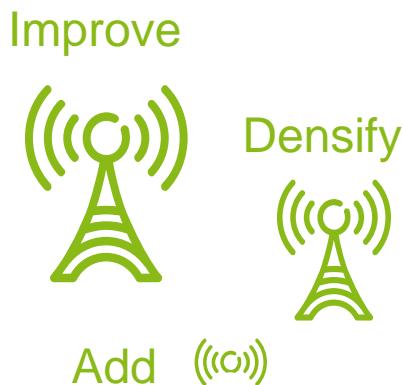
93%

satisfied users

# WHY DEPLOY SMALL CELLS?



- › To improve uplink **coverage**
  - cell edge throughput
- › To increase **capacity**
  - Capacity improves as coverage improves
- › To **offload** congested macro cells

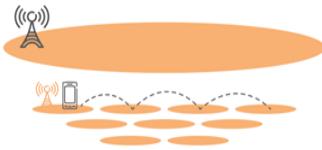


# ONE NETWORK BENEFITS



## Coordinated deployment

### Uncoordinated Cells



### Coordinated Cells

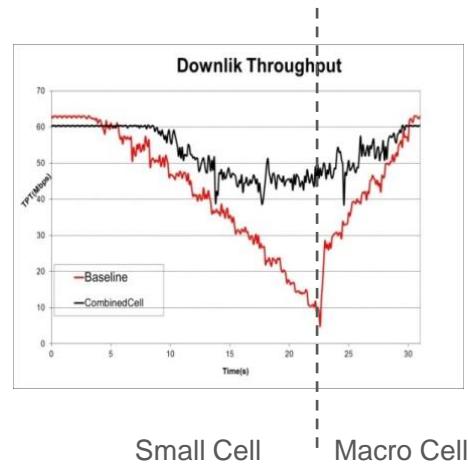


### Baseband Coordination



- › One common spectrum
- › Higher capacity
- › Easy deployment and configuration

## Traffic management features



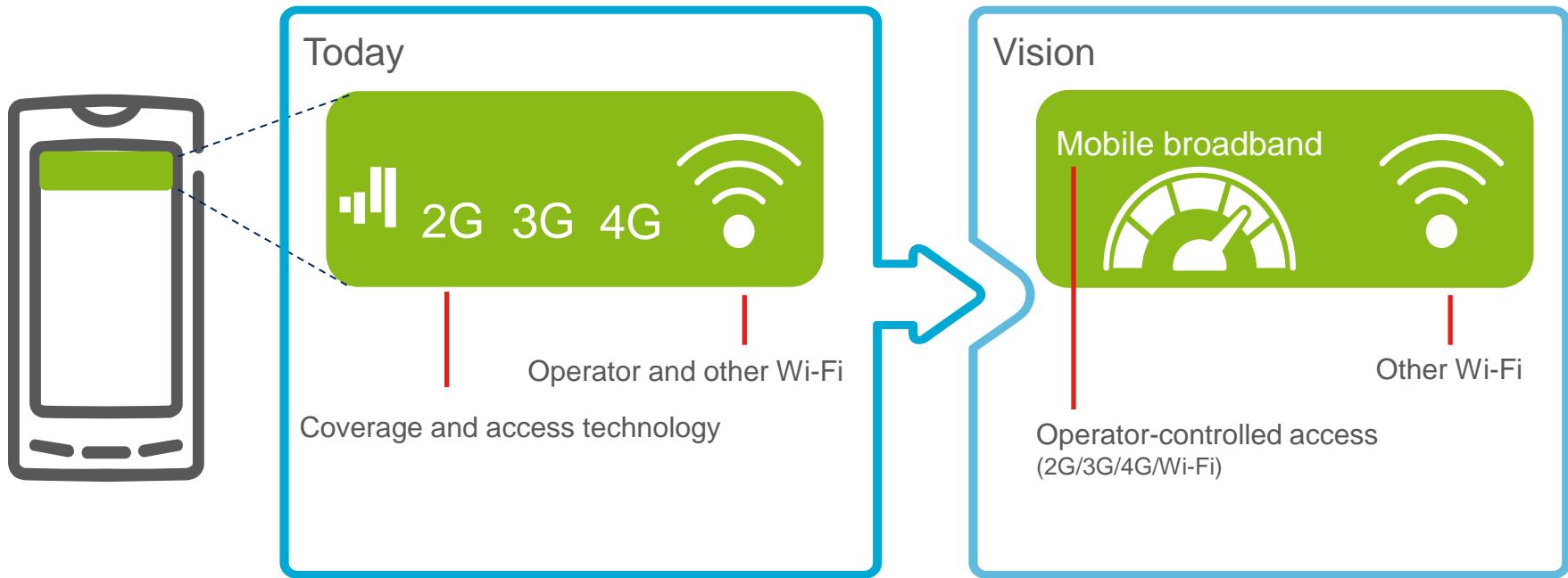
- › Significant improvement in throughput and interference mitigation
- › Seamless mobility for VoLTE

## Common Management



- › Seamless Management between Macro and Small Cell network
- › High quality and efficient O&M
- › Improve network quality and reduce operational expenditure
- › Comprehensive centralized manageability
- › Zero Touch auto-integration & configuration

# RETHINKING OPERATOR WI-FI



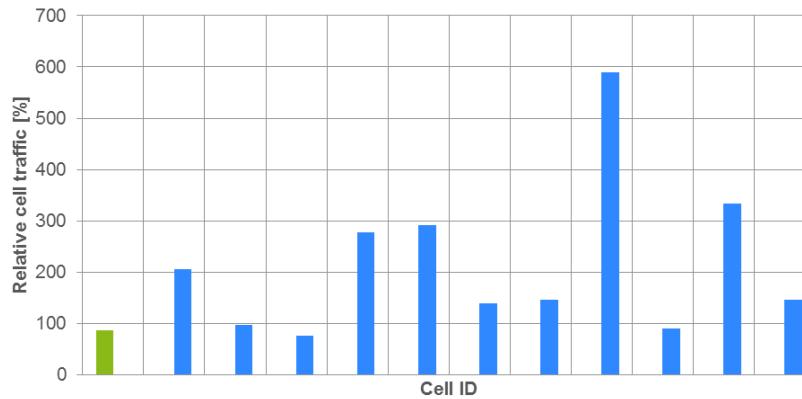
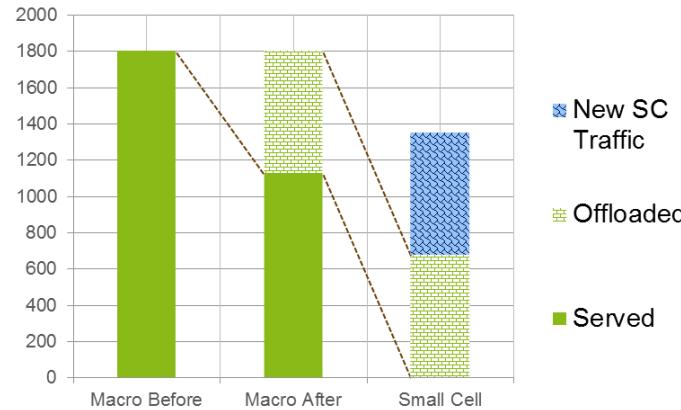
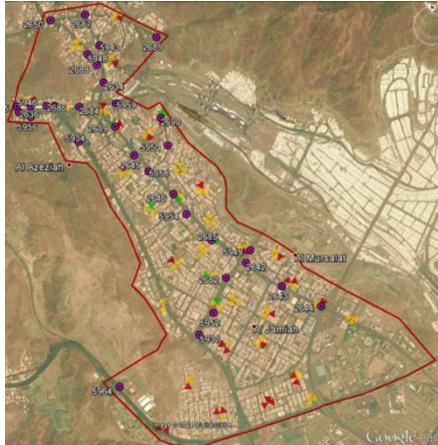
# THIS IS THE RIGHT TIME FOR SMALL CELLS?



There are several places already where we need to introduce Small Cells to keep customer experience on high level



# SMALL CELL EXPERIENCES



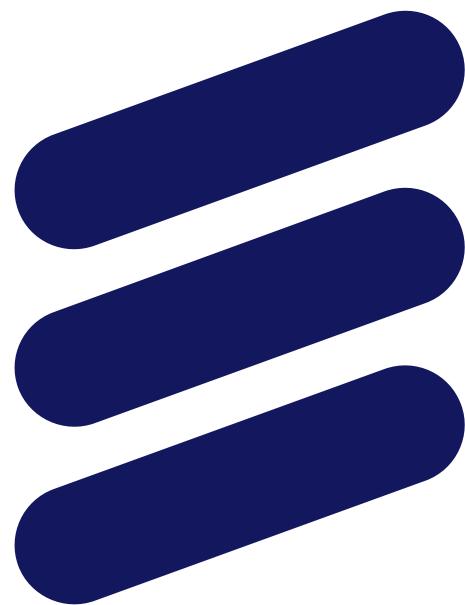
- 36% Macro Offload
- 50% More data traffic
- 100% better DL Throughput
- Voice traffic improved by 58%

11 % WCDMA +10%LTE  
user offload from Macro  
65% better user throughput  
Well-placed micro cells has similar traffic to macro cells

# SUMMARY



- › Heterogeneous Networks include densified Macro Sites, Small Cells and Wi-Fi
- › Mobile Broadband traffic and number of Smartphones growing rapidly
- › Smartphone users demand Application Coverage
- › Ericsson defines three tools in Heterogeneous Networks evolution – Improve, Densify, Add
- › It is the time to start Small Cell introduction in the networks



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