

Source: ZTE, Sanechips

Agenda: 4.3

Discussion on network power saving for 5G Advanced



Evolution to Green 5G Advanced

- **UE power saving techniques**

- **Release 15**

- DRX, BWP adaptation...

- **Release 16**

- Wake-up indication conveyed by DCI format 2-6
 - SCell dormancy behavior implemented by dormant BWP
 - Enhancements on cross-slot scheduling
 - Relaxed neighbour cell measurement for RRC idle/inactive mode UE...

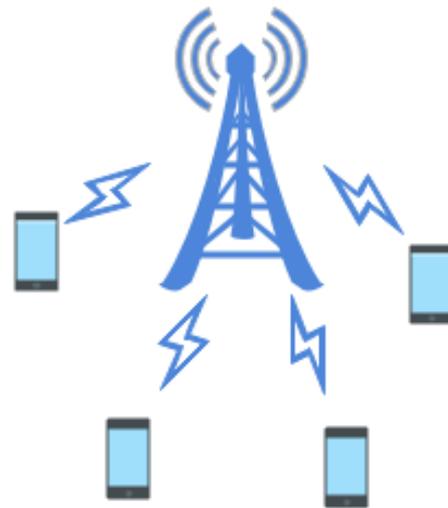
- **Release 17**

- Paging early indication to skip unnecessary PO detection
 - Assistance TRS for RRC idle/inactive mode UE
 - PDCCH monitoring reduction via PDCCH skipping and/or search space set group switching
 - Extended DRX for Redcap UE...

- **Network power saving techniques**

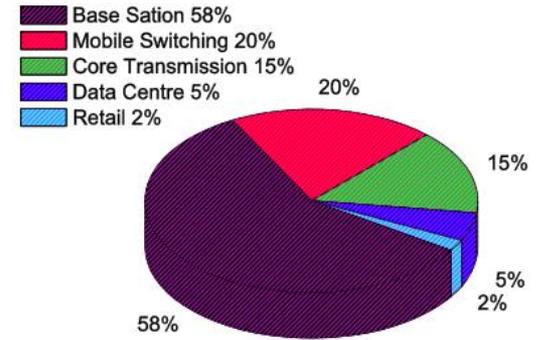
- Autonomously switch on/off cell in Release 15

- ***Network power saving is important for evolution to green and sustainable 5G Advanced network.***



Motivation of network power saving

- **Energy consumed by 5G base station is 3~4 times of 4G base station** ↗
 - About 58% power consumption is associated with base station [1].
- **AAU contributes 80%~90% of the base station power consumption**
 - Increased number of Rx chains (8 Rx → 32/64 Rx) ↗
 - Increased bandwidth (20MHz → 100M Hz for FR1, and 400 MHz for FR2) ↗
 - Increased transmission power (100W → 240W/320W) ↗
 - Increased wireless communication carrier frequency (mmWave) ↗

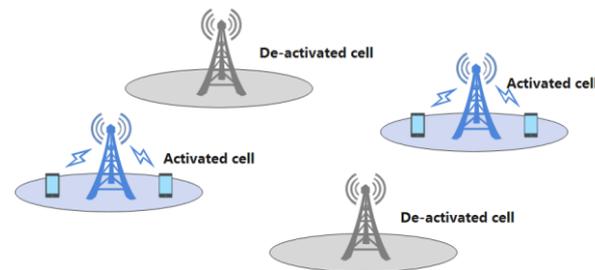
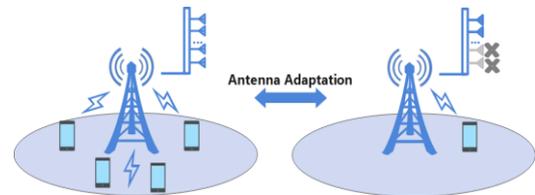


Cellular network power consumption profile [1]

[1] Dutta U K, Razzaque M A, Al-Wadud M A, et al. Self-adaptive scheduling of base transceiver stations in green 5g networks[J]. IEEE Access, 2018, 6: 7958-7969.

Network power saving techniques

- **Green and sustainable 5G evolution**
 - Aim to improve network energy efficiency with minimal impact on system performance
- **Network power saving techniques**
 - **gNB Tx/Rx antenna or beam on-off adaptation**
 - gNB switches off transmit/receive antenna or beams to save power in lightly-loaded system
 - **Extend SSB periodicity**
 - Increase the opportunity of cell de-activation by extending the periodicity of “always-on” signal
 - **UE assistance information**
 - UE reports information of mobility, traffic pattern etc. to assist network power saving
 - **Network coordination**
 - Enhancement on the autonomous cell de-activation/activation mechanism, e.g., ES mode extension; Signalling support of information exchange for network power saving



Potential objectives for network power saving

- **Study the network power saving techniques, including**
 - **Evaluation methodology and solutions for gNB Tx/Rx antenna or beam on-off adaptation [RAN1, RAN2]**
 - **Extend periodicity of “always-on” signal/channel, such as SSB [RAN1, RAN2, RAN4]**
 - **UE assistance information [RAN2]**
 - **Network coordination for network power saving[RAN3]**

Thanks



Tomorrow never waits

