

Scenarios and Requirements for the « Provision of essential services for very low-ARPU areas»

Orange, Telstra

Background and Motivation

Provision of essential services for very low-ARPU areas (3GPP TR 22.891 V1.2.0)

- Today 2 to 3 billions of inhabitants on Earth still do not have access to Internet
 - in many areas, the reason is the cost to deploy and operate networks and acquire terminals
- Bringing connectivity to such areas in an economically sustainable way requires
 - ultra-low cost network infrastructures (e.g. wide coverage)
 - ultra low-cost devices (e.g. ultra low complexity)
 - ultra-low cost operation and maintenance (e.g. energy efficiency)
- Secure interoperability through standard solutions
 - stay ahead of proprietary solutions

Typical Services

Basics: voice, wireless Internet access with DSL-like data rates

Targeted environments

Extreme rural, rural and suburban areas in low population-density and very low ARPU regions

5G needs to offer capabilities for ultra-low cost deployments for low population-density and very low ARPU areas

Deployment scenario attributes and requirements

Deployment scenario definition:

- Spectrum: Bands below 3GHz. With higher priority for bands below 1GHz
- Large and scalable coverage :
 - Different classes of coverage: scaling from 50km up to 100kms or beyond.
 - Densification is not an option in those environments (deserts, water...). Isolated cells.
- User Experienced Data Rate. Several categories of UEs shall be considered, scaling down from 5Mbps DL to several hundreds of Kbps. We suggest to consider UL/DL rate of 1/3:
 - [5] Mbps DL for cells up to 50km range.
 - [1] Mbps DL for cells up to 100km range
 - [few 100s] kbps DL for cells beyond 100km range
- Traffic:
 - Connection density: [16]/ km².
 - Traffic/month/user (subscription): [3] Gbytes/month/user
 - Average data throughput at busy hours/user: [30] Kbps
 - Traffic density: [480] Kbps/km²
- Speed: on demand from 0 to [50] km/h

Service requirements

- Relaxed mobility constraints. Basic idle mode mobility is a minimum.
- Support of Voice and Data services
- Ultra Low cost devices: smartphones, CPEs, Datacards, etc

Deployment scenario attributes and requirements

Operation requirements

- Energy consumption : Solar energy/batteries are used in general to compensate for the absence of electrical power grid in these environments. The BS shall support an energy saving mode with the following characteristics:
 - The energy saving mode may be activated/deactivated either manually (e.g., on demand), or automatically (e.g., reaching a threshold).
 - The transmit power may be reduced or even shut down when the energy saving mode is activated.
 - The latency requirements may be reduced when the energy saving mode is activated.
 - Service may be restricted to authorized users.
 - The base station may be in listen mode.
- Backhauling cost needs to be drastically reduced:
 - The 3GPP system shall support very efficient use of the control plane (e.g., cooperation between services to minimize overall signalling between a UE and the network).
 - The 3GPP system shall support efficient use of the data plane (e.g., packaging data from multiple applications and sending it on a periodic basis rather than an on demand basis).
 - The 3GPP system shall support APIs that provide network status information to applications (e.g., to allow applications to use network resources efficiently).
 - The 3GPP system shall be optimised to minimise as much as possible the traffic (Data and control signalling) on the interfaces between the access network and the CN in order to reduce the amount of backhaul traffic.
- The 3GPP system shall support centralized network automation and remote management in order to reduce local management tasks (SON capabilities) : e.g. Self configuration, Self optimization, Self healing.
- The data rate transfer should be enhanced at the cell edge for very large cells.
- 4 The access network shall be able to inform UEs what capabilities are supported
 - (e.g., to allow UEs to determine if the network provides the required capabilities).