Third Generation Partnership Project Service Requirements for Machine Type Communications

- Approach
- Architectural Reference Model for MTC

☐ **Third Generation Partnership Project Service Requirements for Machine Type Communications (MTC) Approach** Current mobile networks are optimized for human- to-human (H2H) traffic and not for M2M/MTC interactions; hence, optimizations for MTC are advantageous.For example, one needs lower costs to reflect lower MTC ARPUs (average revenue per user); also, there is a need to support triggering.Hence, 3GPP has started work on M2Mspecification in 2010 for interoperable solutions, particularly in the 3G/4G/LTE context.

In architecture, the interfaces are as follows:
Third Generation Partnership Project Service Requirements for Machine Type Communications (MTC) Approa chIn architecture, the interfaces are as follows: MTCu: provides MTC devices access to the 3GPP network for the transport of user traffic; MTCi: the reference point for MTC server to connect the 3GPP network via 3GPP bearer service; MTCsms: the reference point for MTC server to connect the 3GPP network via 3GPP SMS.

The key document 3rd Generation Partnership Project Service Requirements for Machine Type Communications—focused on over load and congestion control, extended access barring (EAB),low priority access, APN (access point name)-based congestion control, downlink throttling.

Third Generation Partnership Project Service Requirements for Machine Type Communications (MTC) Approach For MTC communication, the following communication scenarios are identified:(i) MTC devices communicating with one or more MTC server;(ii) MTC devices communicating with each other.

Third Generation Partnership Project Service Requirements for Machine Type Communications (MTC) Approach For MTC devices communicating with one or more MTC servers, the following use cases exist:(a) MTC server controlled by the network operator; namely the MTC server is located in the operator domain. Here The network operator offers API (e.g., Open Systems Architecture [OSA]) on its MTC server(s)MTC user accesses MTC server(s) of the network operator via API(b) MTC server not controlled by the network operator; namely MTC server is located outside the operator domain. Here The network operator offers the network connectivity to the MTC server(s) located outside of the network operator domain

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MTC applications do not all have the same characteristics. This implies that not every system optimization is suitable for every MTC application. Therefore, MTC features are to provide structure for the different system optimization possibilities that can be invoked.

The following MTC features have been defined: Low mobility Time controlled Time tolerant Packet switched (PS) only (here the MTC feature PS only is intended for use with MTC devices that only require packet switched services) Small data transmissions Mobile originated only Infrequent mobile terminated MTC monitoring Priority alarm Secure connection Location-specific trigger Network provided destination for uplink data Infrequent transmission

Third Generation Partnership Project Service Requirements for Machine Type Communications (MTC) Architectural Reference Model for MTC

3rd Generation Partnership Project Service Requirements for Machine Type Communications focuses on numbers and addressing, on improvements of device triggering, and on interfaces between MTC server and mobile network. Referring to Figure in next slide,

Third Generation Partnership Project Service Requirements for Machine Type Communications (MTC) Architectural Reference Model for MTCMTC-IWF is a new interworking function between (external) MTC server and operator core network handling security, authorization, authentication, and charging. MTCsp is a new control interface for interactions with MTC server

hird Generation Partnership Project Service Requirements for Machine Type Communications (MTC) Architectural Reference Model for MTC The end-to-end application, between the user equipment (UE) used for MTC and the MTC application, uses services provided by the 3GPP system, and optionally services provided by an MTC server. The 3GPP system provides transport and communication services (including 3GPP bearer services, IMS, and SMS) including various optimizations that can facilitate MTC.UE used for MTC connecting to the 3GPP network (UTRAN, E-UTRAN, GERAN, I-WLAN, and so on) via the Um/Uu/LTE-Uu interface.

The architecture encompasses a number of models as follows:Direct model —direct communication provided by the 3GPP operator: The MTC application connects directly to the operator network without the use of any MTC server; Indirect model —MTC service provider controlled communication: The MTC server is an entity outside of the operator domain. The MTCsp and MTCsms are external interfaces (i.e., to a third-party M2M service provider);Indirect model—3GPP operator controlled communication: The MTC server is an entity inside the operator domain. The MTCsp and MTCsms are internal to the public land mobile network (PLMN);Hybrid model: The direct and indirect models are used simultaneously in the hybrid model, for example, connecting the user plane using the direct model and doing control plane signalling using the indirect model.

Third Generation Partnership Project Service Requirements for Machine Type Communications (MTC) Architectural Reference Model for MTC In several countries, regulators have indicated that there are not enough (mobile) numbers available for M2M applications.3GPP postulates that solutions will have to support 100× more M2M devices than devices for H2H communications. Proposed solutions include:(i) mid-term solution: special M2M number ranges with longer telephone numbers (e.g., 14 digits);(ii) long-term solution: no longer provide telephone numbers for M2M applications.

CENELEC European Committee for Electrotechnical Standardization (CENELEC)has adopted the transport profile of Siemens' distribution line carrier communication protocol (CX1) as a standardization proposal. The standard aims at supporting open and fault tolerant communication via powerline in intelligent power supply grids. As the basis for the transmission protocol, which uses the low voltage network as a communication channel for data of grid sensors and smart meters, the transport profile has been designed to ensure interoperability in accordance with EU Mandate M/441.

CENELEC CENELEC TC 13 was planning to forward the CX1 transport profile to TC 57 of the International Electrotechnical Commission (IEC).CX1 is already used to connect meters and other intelligent terminal devices in Siemens' SG metering systems, such as in the load switching devices that will replace household ripple control receivers. The systems collect energy consumption data and network information, which are then relayed to a control center for further processing. The communication protocol can handle any change in the physical communication parameters of a low voltage power supply grid, such as signal attenuation, noise, network disruption and signal coupling, as well as operational changes in network configuration. The protocol can also be integrated into existing IEC protocol-based network automation and energy management infrastructures.