Is Electric Power Ready for 5G?

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HUAWEI



5G: Diversified Application Scenarios, Enable Intelligent World

Diversified application experience

Network capability requirements of three applications





5G Roadmap and Challenges for Vertical Industry



mmWave





A recommended architecture of Electricity industry IoT network is LTE: (private)+NR (public 5G)



Potential Application Scenarios of 5G Serves to Improve Grid Reliability and Resilience



Achieve Grid Full Awareness via Ubiquitous Electricity IOT And Service Over 5G mMTC





Communications Requirement

Bandwidth	1-10kbps / node
Latency	100ms~ 1 second
Jitter	NA
Reliability	99.99%
Security	Zone III/IV: logic separation, authentication and encryption, Sharing network slice
5G Terminal	Embedded module/CPE
Features	Deep coverage (underground, tunnel) Large connections (~thousands/km2)

Distribution Automation over 5G uRLLC









Lack of communications

Service

Communic

ations

Grid

Reliability

Distribution automation not supported; Real-time control not supported F1 fault, master station remote operation and recovery

Latency<100ms, Fiber Optic /eLTE

Support distributed resources monitoring Low cost TCO Not impacted by Typhoon, wireless communication. Real-time-control not supported



F1 fault, distributed automatic fault identification, isolation and operation

Latency<10ms,
5G slice uRLLC: low TCO / Fast delivery

Support distributed resources real-time control to ensure grid reliability and resilience. Support distribution automation Low cost TCO, shared ROI for different industries. Not impacted by typhoon, wireless communication.



Huawei Practice 1: 5G Bearing Tele-protection Test by China Southern Power Grid

CSG, China Mobile and Huawei performed line differential tele-protection field test over 5G NSA network, proving 5G uLLC meets the requirements of mission critical services





Communication latency between DTUs < 10ms
5G timing synchronization deviation < 300ns

5G performance satisfies and supports various protection and automation applications

Electric Power application requirements are considered in 5G networking equipment R&D, the testing proves that it meets industrial application requirements. 5G serves as a reliable communication channels for



World's first field testing of line differential over 5G network with China Southern Grid

Smart Inspection (AR/UAV/Robot) over 5G eMBB





Communications Requirement		
Bandwidth	AR: ≥30Mbps UAV/Robot: ≥2Mbps	
Latency	AR: < <mark>50ms</mark> UAV/Robot: <300ms	
Jitter	NA	
Reliability	Video > 99.99%; UAV Remote Control > 99.999%	
Security	Zone III/IV: Logic separation, authentication and encryption sharing network slice,	
5G Terminal	CPE/Embedded module	
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5G Empowers Smart Grid and Supports Grid Reliability and Resilience



Generation

Ancillary services via 5G backup network

Real-time control of distributed renewables

Virtual power plant control driven by electricity market

Substation and Transmission

Backup communication channel for dispatch and control

Al enabled near real-time diagnosis and alarming for transmission and substation

Al and 5G supported drones for transmission line survey

Distribution

Support distribution automation

Electric Vehicles Optimal Charging Control

Virtual Power Plant Aggregate distributed small scale resources

Fast recovery of communication network



Global 5G deployment



UAE 5G deployment: in downtown and hotspot for the 1st wave

Etisalat 5G @Dubai



Driverless vehicles tested on 5G technology



CSG is among the 1st wave of commercialization



Bring Digital to Every Person, Home and Organization for a Fully Connected, Intelligent World



190+ Electric Power Companies around the World Choose Huawei



Huawei Provide 5G E2E Solutions

Cloud, Big Data, IoT, 5G, AI, Block chain

Core

Del De

Transport

C-Band mmWave

ive Indoor

BBU

CPE

5G Chipset Fast and continuous innovation Smart 5G Antenna Enable smooth evolution

5G Smart Terminals Accelerate 5G Applications

• 8 Global 5G R&D Centers

- 1st SG178 Antenna Test Lab
- No.1 Market Share

Kirin 980

5G smart phones and terminals

