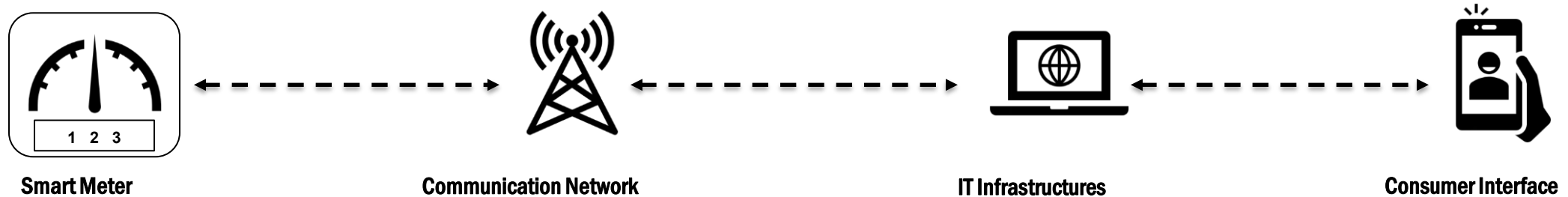


# Communication Solutions for Smart Grids and Smart Cities

**Speaker : *Amit Sharma, Director, EY***

## Communication Solutions for Smart Grids and Smart Cities

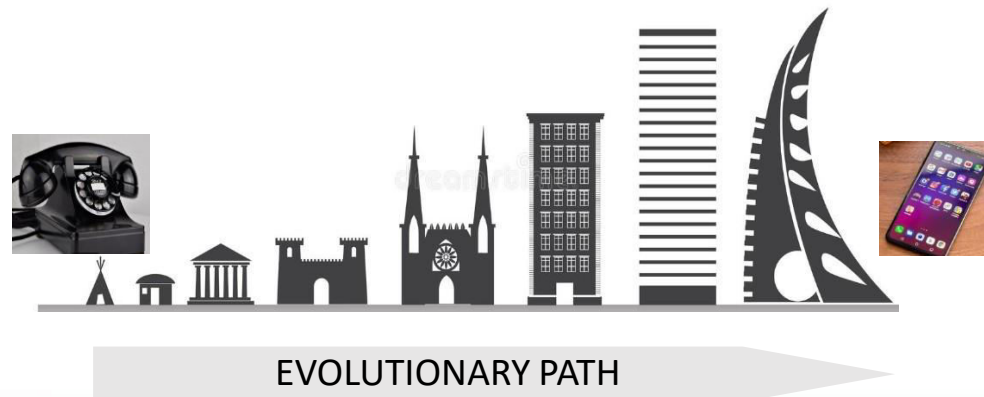
“Evolving smart cities require evolving advanced communication network”



### SMART COMMUNICATION EXPECTATION:

- No loss of data & nil-to-low latency
- No interruptions in operations
- No dependency on licensed or free bands
- Low power & ability to connect more devices
- Agreed SLAs (>99.9%) with Utilities with Penalty
- Indian specific standards
- Cost efficient & lower maintenance
- Better quality of service
- Self healing & auto discovery
- Lower dependency on network provider for configurations

The evolution of architecture



### Major parameters for communication technologies:

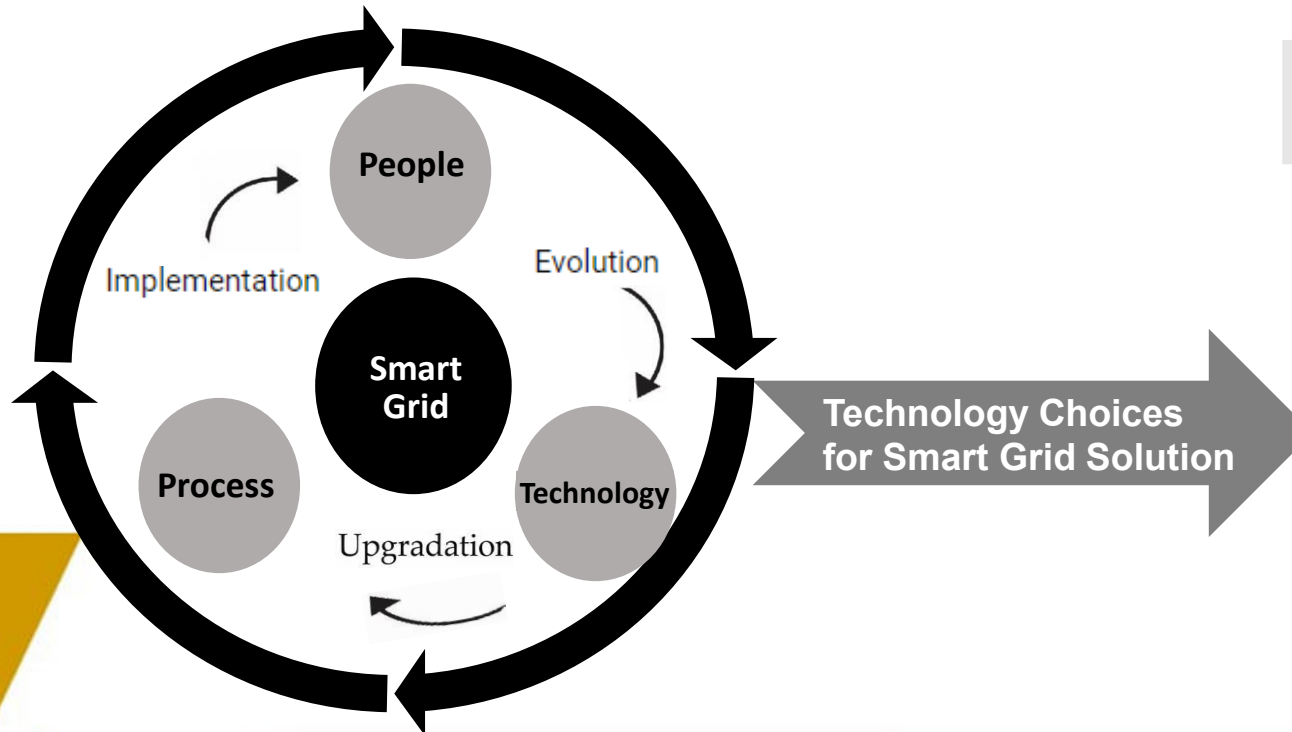
- Cost
- Area of coverage
- Spectrum
- Security
- Efficiency
- Topologies
- Reliability

Modern utilities have expanded their horizons:

- ▶ No longer weakened by insufficient network capabilities
- ▶ Not dependent on single vendor solutions.

The key to success for utilities are to work with:

- ▶ Sustainability of technology
- ▶ Reliable partner



## Evolving Technology

- ▶ No One-Size-fits-all, the evolving technologies
- ▶ Well suited to all applications.
- ▶ Cost efficiency and ubiquity.

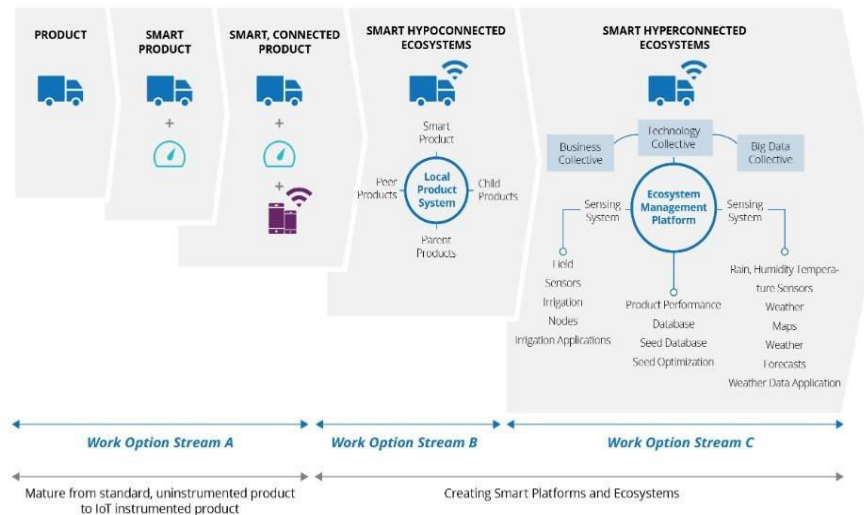
## 5G Technology

- ▶ 5G technology is expected to be a turning point.
- ▶ 5G will propels smart city technology into the mainstream.
- ▶ Accelerated new deployments.

## Tech Choices for Smart Grid

Communication infrastructure enables

- ▶ Bi-directional flow of information
- ▶ Knowledge & decision making.
- ▶ Transparently, efficiently, reliably, sustainably to all stakeholders.



## Bi-directional flow of information

Smart Grid

Customers

## Issues faced

- Network Performance
- Suitability
- Interoperability
- Security

## Key Focus

### QoS

- SCADA
- OMS
- EMS
- DERMS
- ADMS



# Communication Technology matrix at a glance

## Comparison of various Technologies are tabulated

Parameters	Cellular (2G/3G/4G/5G)	RF	NB-IoT	LoRa	Optical Fibre	PLC
Topography	Scattered & Dense	Dense Population	Scattered & Dense	Dense population	Dense population	Dense population
Topology	Point to Point	Mesh	M2M	Star	Bus	Bus
Spectrum	500 MHz-2.5 GHz - 4G 28 GHz -36 GHz - 5G (licensed)	865-867 MHz (licensed)	3G - 4G spectrum (licensed)	867-896 MHz (unlicensed)	>100 MHz	50 to 500 kHz
Area Coverage (Urban)	2-2.5km	<500m	2-2.5km	5-10 km	Wherever cables are laid	
Cost of Implementation	Low	High	Low	Low	Cost depends on site feasibility	
Easy of implement	Very easy	Complex	Very easy	Very easy	Need to lay wires and establish connectivity at every location	
Interoperability	Plug and play	Complex integration	Plug and play	Plug and play	Not interoperable	
Technology obsolescence	Low	Low	Medium	High	For larger deployment - Not used, Small Pilot Project - May be used for high success	
Data Speed	High for 5G	Medium	Medium	Low	Very high speed	
Latency	Low	Low	High	Medium	Very less Latency in the order of	
Application	Smart grid, Smart Cities, telecom	Smart grid, Smart Cities	Smart Grid	Home Automation, Smart Cities	Smart Grid, telecom	
Max. nodes covered	High	Medium	High	Low	No Limit	
Security	Very Secure	Very Secure	Very Secure	Less Secure	Very Secure	
Power Consumption	Medium	High	Low	Very Low	Transmission loss is higher	
SLA Performance	Medium	High	Medium	Low	80-85% (for large deployment), 90% (for small pilot deployment)	



## CASE STUDY ANALYSIS FOR THE IDENTIFIED KPI



**Location:** Jammu & Kashmir.

**Topology:** Densely Populated

**Situation/ Challenges:** Place is densely populated, area is also mountainous, special permission for communication required.

**Result:** J&K opted for RF communication as cellular communication requires special permission in J&K region. Secured communication was required as J&K is a cyber-attack prone zone. RF communication would give better SLAs in the zone.

### Points Considered

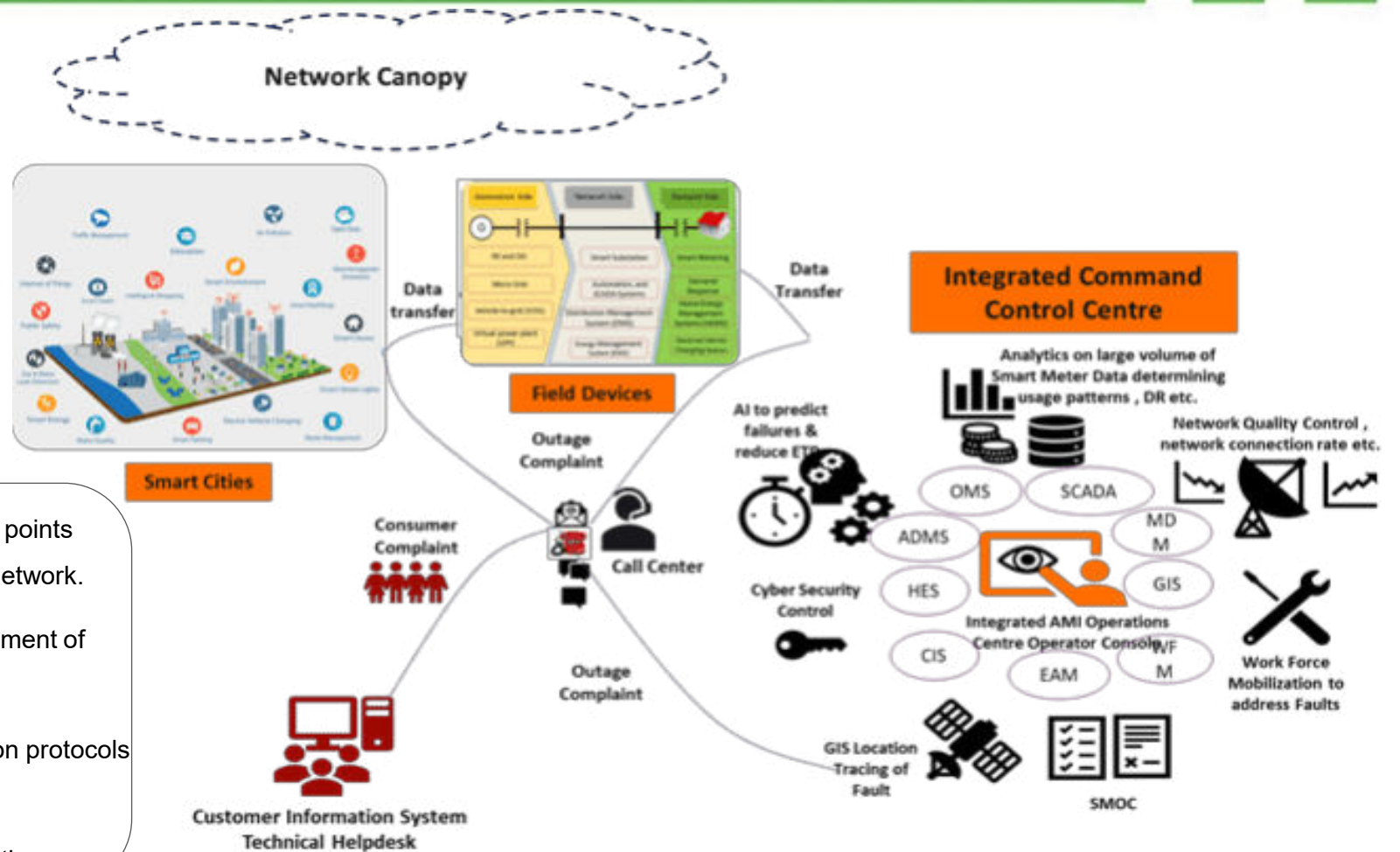
- ▶ Topography
- ▶ Topology
- ▶ Spectrum
- ▶ Network availability
- ▶ DISCOM fund availability & preference.
- ▶ SLA performance
- ▶ Power Consumption
- ▶ Interoperability
- ▶ Data Speed
- ▶ Latency
- ▶ Ease of implement
- ▶ Cyber-Security

# The Best-fit solution

- ▶ Communication Technology : Vital combination for smart grid + smart cities.
- ▶ Flow of right set of data in applications
- ▶ Communication canopy network platform
- ▶ Support multiple Smart Grid applications.

Integrated Command Control Centre (ICCC) for Smart cities

- ▶ Communicate with multiple end points simultaneously over the same network.
- ▶ Maintains priority as per requirement of operational applications.
- ▶ Supports multiple communication protocols with flexibility.
- ▶ Maintains real-time synchronization

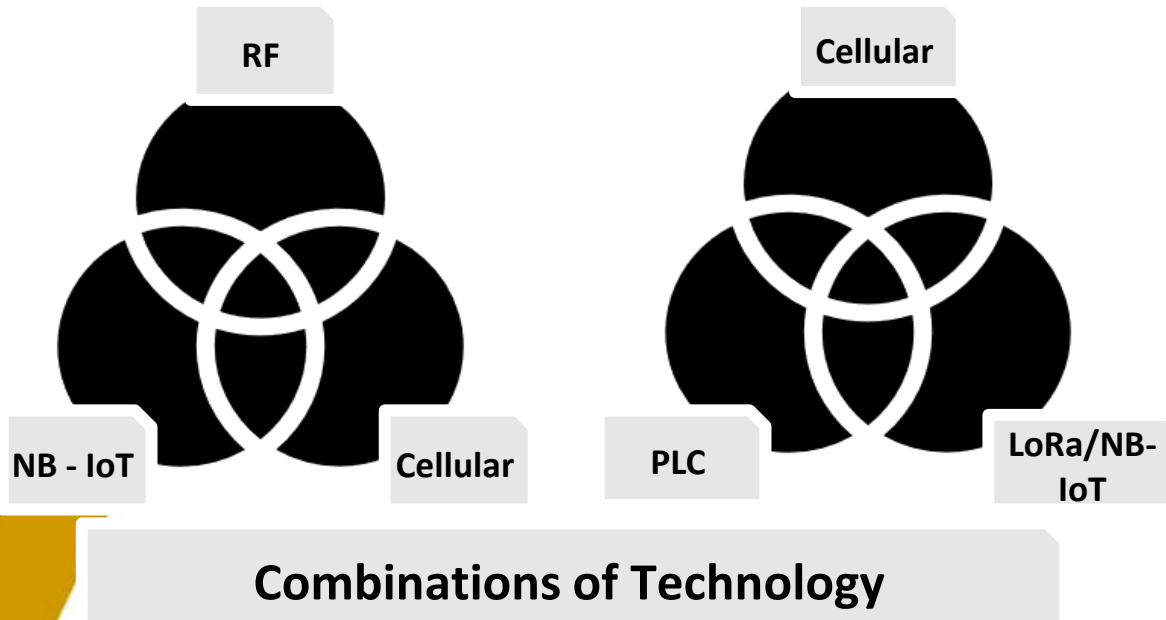




# Technology for Smart City Solutions

## Realization of Benefits:

- ▶ Application usage
- ▶ Flexibility at unified platform



Perspective of different key-stake holders

Stakeholder	Benefits
Utilities	Efficiently monitoring of real-time data to understand consumer consumption behaviour through Smart metering System
Consumer	Remotely monitor energy usage and manage energy consumption in real-time and take cost-effective decision
System Integrator	Meet SLA requirements of the parameters of Smart Metering System.



## CURRENT

- RF & Cellular are the widely used communication technology in smart metering.
- SLA driven parameters based on communication technology
- Pilot projects on Nb-IoT, LoRa to check feasibility.

## NEXT....

- 5G networks are expected to become widely available in the coming years. This technology will offer significantly faster data transfer rates, lower latency, and higher reliability than existing 4G networks.
- E-SIM Solutions in smart meters
- Robust SIM software for Utilities to monitor SLA

## BEYOND NEXT...

- Primary & secondary mode of Communication to be ensured for interoperability, profitability, SLA adherence etc.
- Cost-effective combinations like RF & NB-IoT, LoRa & NB-IoT can be tested in pilot cases for feasibility.
- Wired solutions like PLC & OFC as primary; secondary backhaul NB-IoT, LoRa may be explored.
- RF canopy supports multiple application, endpoints to be connect by AMI, HES & SMOC

# Thank You

*For discussions/suggestions/queries email: [isuw@isuw.in](mailto:isuw@isuw.in)*

*[www.isuw.in](http://www.isuw.in)*

*[Links/References \(If any\)](#)*

