

# Internet of Things and 5G

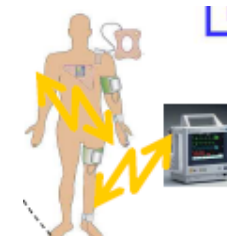
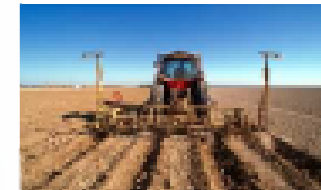
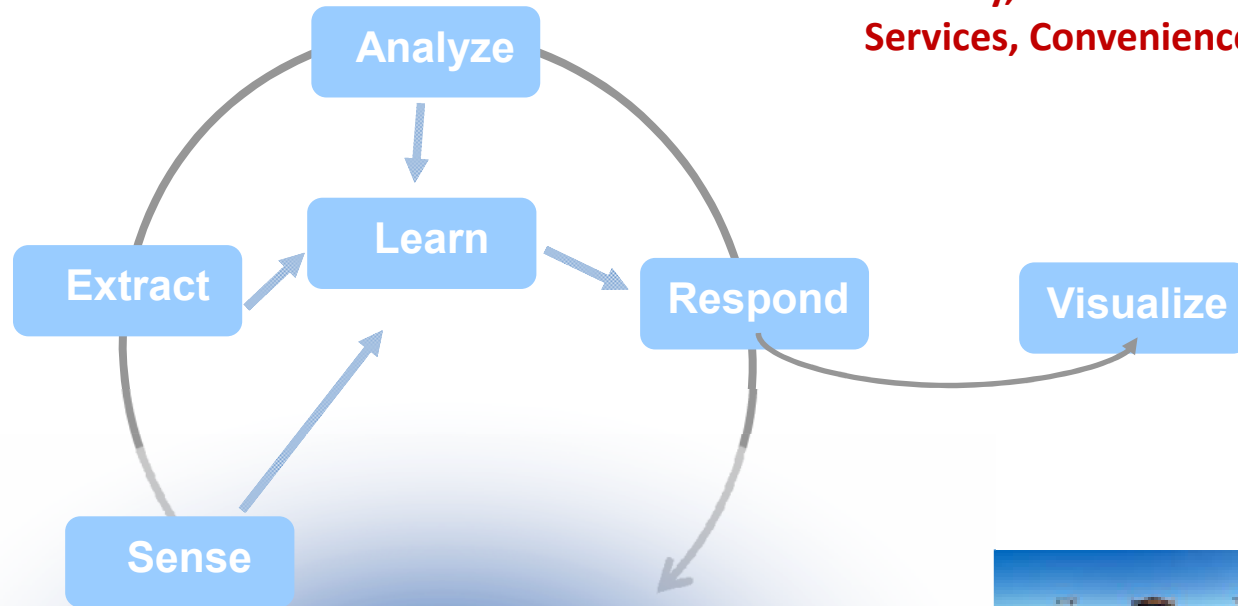
GISFI IoT WG Activities

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# IoT System

**Operational Efficiency, Safety & Security, Information Services, Convenience**



# IoT WG Scope

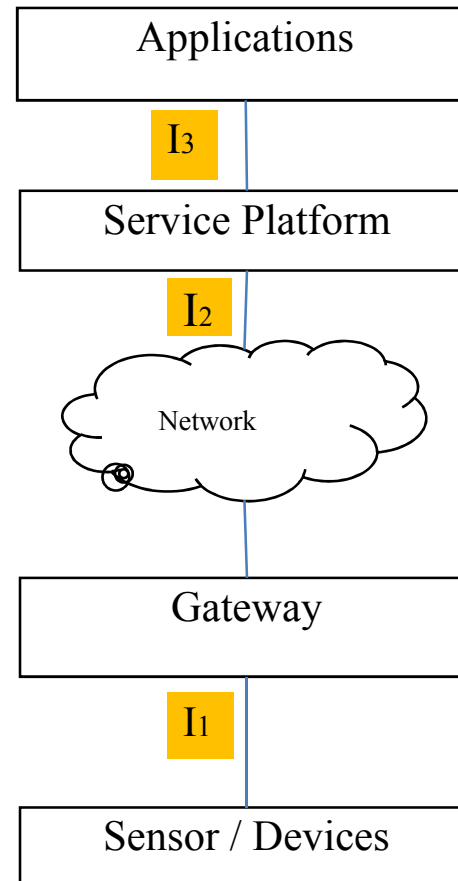
- Study and develop potential standards that can help proliferating the IoT technology and its applications that are relevant to India for the benefit of the society and businesses through international cooperation.
- Architecture
- Software and middleware platforms
- Interfaces and interoperability
- Security and Trust
- Business models
- Test & Validation
- Societal and ethical implications

# IoT WG work

- Study of IoT Use cases, Requirements
  - India Specific Requirements
  - Study and evaluation of IoT architectures
  - Reference Architecture
  - IoT Security Scheme / Protocol
    - Two proposals
  - Reference Architecture & Security – Draft TS
- mHealth, Connected Health Care
  - Food Supply Chain Management
  - Security, Surveillance
  - Agriculture monitoring, Landslide detection
  - Smart metering and control.
  - Smart Cities

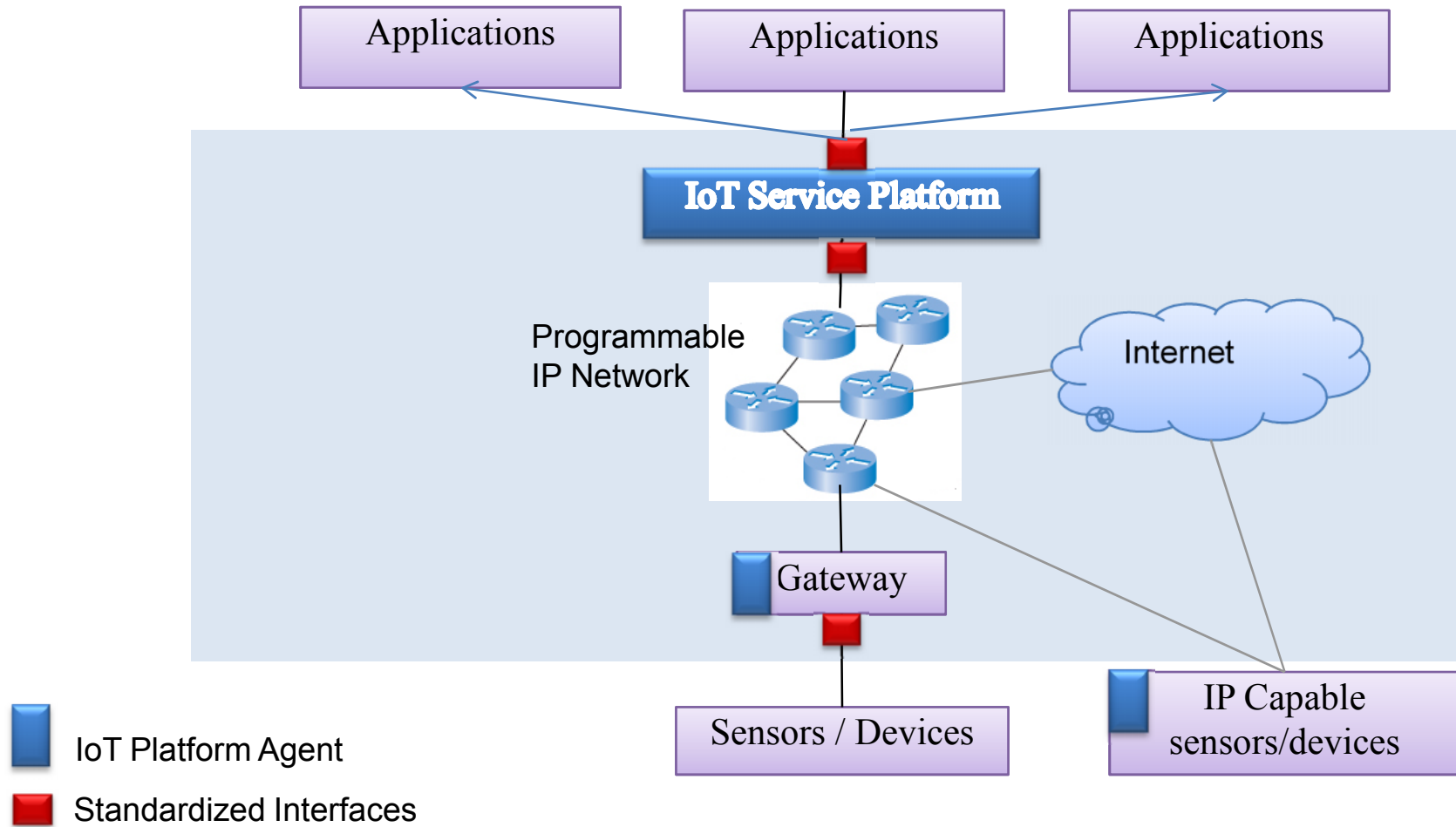
**Cost**  
**Scale**  
**Robustness**  
**Diversity**  
**User friendly**

# Reference Architecture



Baseline  
Architecture  
specs

# IoT Reference Architecture – Possible evolutions



# IoT in 5G

Direct Device-to-Device Communication

Massive Machine Communication

Networks in Motion

Ultra Dense Networks

Ultra-Reliable Communication

# **Native support for machine-to-machine (M2M) communication**

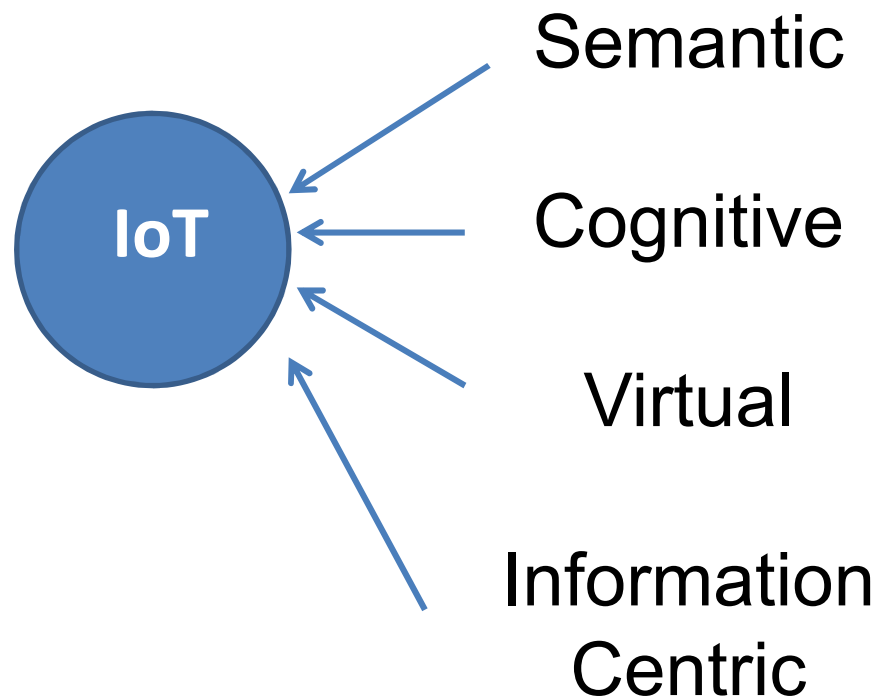
- Support of a massive number of low-data-rate devices, sustaining a minimal data rate in virtually all circumstances, and very-low-latency data transfer.
- Requires new methods and ideas at both the component and architectural levels.



# D2D

- D2D will play multiple roles in 5G and improve reliability, latency, throughput per area, spectral efficiency,
- Extending machine-type access
- Extended coverage in D2D
  - multi-hopping
  - network coding
  - cooperative diversity
- Low power uplink
  - Underlay operation in the same spectrum

# Next Gen IoT



**THANK YOU**

# D2D Topics of Exploration

- Leader election
- Neighbor discovery
- Link rendezvous
- Interference control
- Diversified connection
- Offloading and catching

# IoT Security

- **Challenges**
  - **Promiscuity across networks**
  - **Connected devices are stupid**
  - **Owners of connected devices act stupid**
  - **Evolving and unknown**
  - **New attacks – Denial of Power**

- Strategic and special purpose networks for defense, emergency response, secure intelligence, secure administration, railways and isolated communities all are visualized to be based on common technology and in a suitable network deployment architecture.
- How 5G Technology and networks would be required to bring the practical reality to the direction already shown by 4G Technology and Networks will also be the focus of this session

- SDN: Separation of data- and control-path
- • NFV: Flexibility in controlling architecture components
- • Elasticity in data- and control-path
- • Smart usage of network resources
- • Dynamic Service Chaining