SNS COLLEGE OF ENGINEERING

An Autonomous Institution

Coimbatore-107

19IT503-INTERNET OF THINGS

UNIT-2 FUNDAMENTAL MECHANISMS & KEY TECHNOLOGIES

Topic:3- Structural aspects of IoT

Structural Aspects of the IoT

- **Structural Issue related to**
  - Environment Characteristics
  - Traffic Characteristics
  - Scalability
  - Interoperability
  - Security and Privacy
  - Open Architecture

Environment Characteristics

□ Most (but certainly not all) IoT/machine-to-machine (M2M) nodes have design constraints:

- ▣ Low power (with the requirement that they will run potentially for years on batteries)

- ▣ Low cost (total device cost in single-digit dollars or triple digit rupee)

- ▣ Significantly more devices than in a LAN environment

- ▣ Severely limited code and RAM space (e.g., generally desirable to fit the required code—MAC, IP, and anything else needed to execute the embedded application—in, for example, 32K of flash memory, using 8-bit microprocessors)

- ▣ Unobtrusive but very different user interface for configuration (e.g., using gestures or interactions involving the physical world)

- ▣ Requirement for simple wireless communication technology. In particular, the IEEE 802.15.4 standard is very promising for the lower (physical and link) layers

Traffic Characteristics

□ The characteristics of IoT/M2M communication is different from other types of networks or applications.

    ▫ For example, cellular mobile networks are designed for human communication and communication is connection centric; it entails interactive communication like

        ■ between humans (voice, video), or data communication involving humans (web browsing, file downloads, and so on).

        ■ It follows that cellular mobile networks are optimized for traffic characteristics of human-based communication and applications.

□ But in IoT, M2M the expectation is that there are many devices, there will be long idle intervals, transmission entails small messages, there may be relaxed delay requirements, and device energy efficiency is paramount.

TABLE 4.1 Properties and Requirements of M2M Applications

	ITS	e-Health	Surveillance	Smart Meters
Mobility	Vehicular	Pedestrian/ vehicular	None	None
Message size	Medium	Medium?	Large	Small (few kB)
Traffic pattern	Regular/ irregular	Regular/ irregular	Regular	Regular
Device density	High	Medium	Low	Very high (up to 10,000 per cell)
Latency requirements	Very high (few milliseconds)	Medium (seconds)	Medium (<200 ms)	Low (up to hours)
Power efficiency requirements	Low	High (battery power devices)	Low	High (battery-powered meters)
Reliability	High	High	Medium	High
Security requirements	Very high	Very high	Medium	High

Courtesy: A. Maeder, NEC Laboratories Europe.

Scalability

- The application and its a desire over time for the service decides the Scalability.

- When contemplating expansion, one wants to be able to build on previously deployed technology (systems, protocols), without having to scrap the system and start from scratch.

- The efficiency of a larger system should be better than the efficiency of a smaller system.

- This is what is meant by scalability.

- The goal is to make sure that capabilities such as addressing, communication, and service discovery, among others, are delivered efficiently in both small and large scale.

Interoperability

□ Applications, technology suppliers, and stakeholders, it is desirable to develop and/or re-use a core set of common standards.

□ To the degree possible, existing standards may prove advantageous to a rapid and cost-effective deployment of the technology.

Security and Privacy

☐ IoT relates to electric power distribution, goods distribution, transport and traffic management, e-health, and other key applications, as noted earlier

☐ It is critical to maintain system-wide confidentiality, identity integrity, and trustworthiness.

Open Architecture

□ The goal is to support a wide range of applications using a common infrastructure, preferably based on a service-oriented architecture (SOA) over an open service platform, and utilizing overly networks (these being logical networks defined on top of a physical infrastructure)

Thank you