6LoWPAN

Overview of LoWPAN

- A simple low throughput wireless network comprising typically low cost and low power devices
- Devices in the network typically work together to connect the physical environment to real world applications, e.g., wireless sensors networks
- Common topologies include – star, mesh, and combinations of star and mesh
- The Phy and MAC layers ***conform*** to IEEE 802.15.4-2003 standard

- **Fully functional devices (FFD),** which have full network functionalities and
- **Reduced functional devices (RFD),** which possess limited functionalities

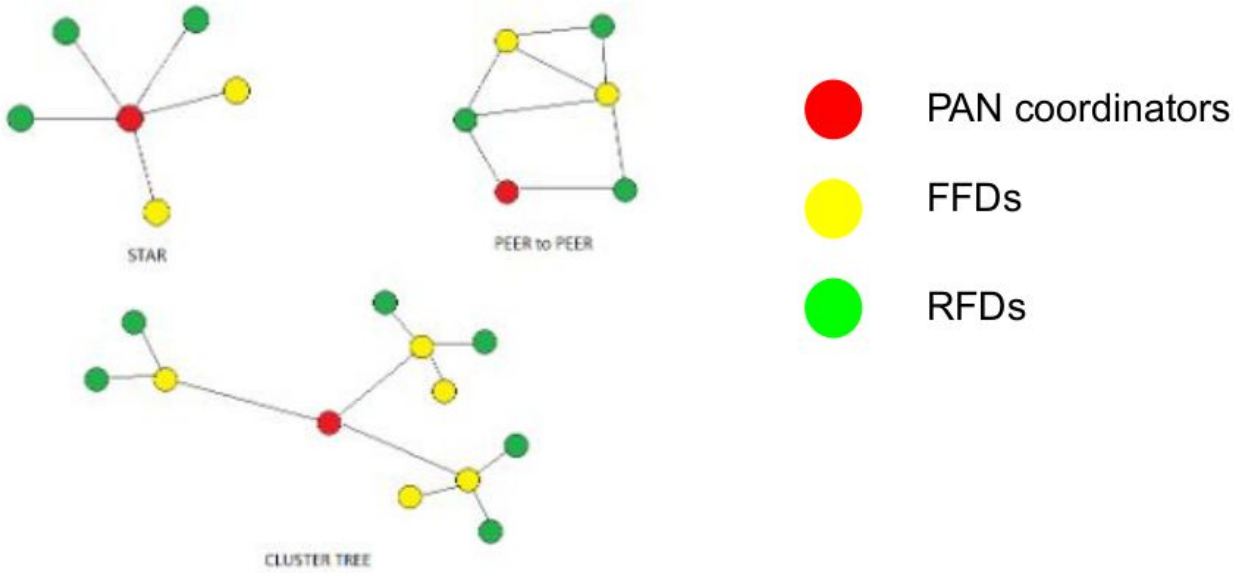


Fig. 1. Network Topologies

LoWPAN architecture

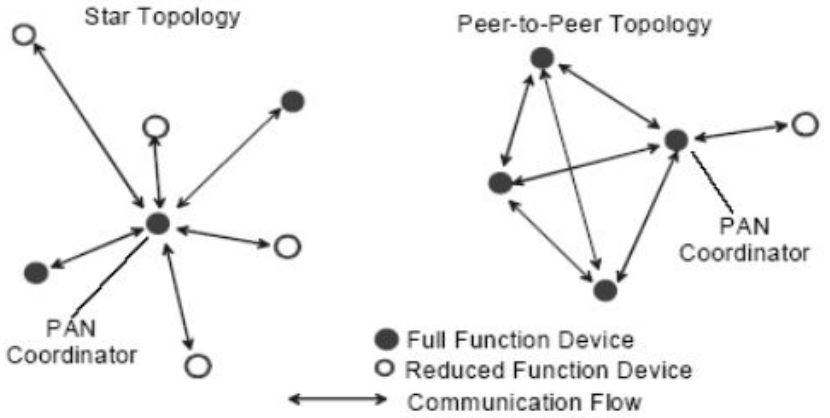


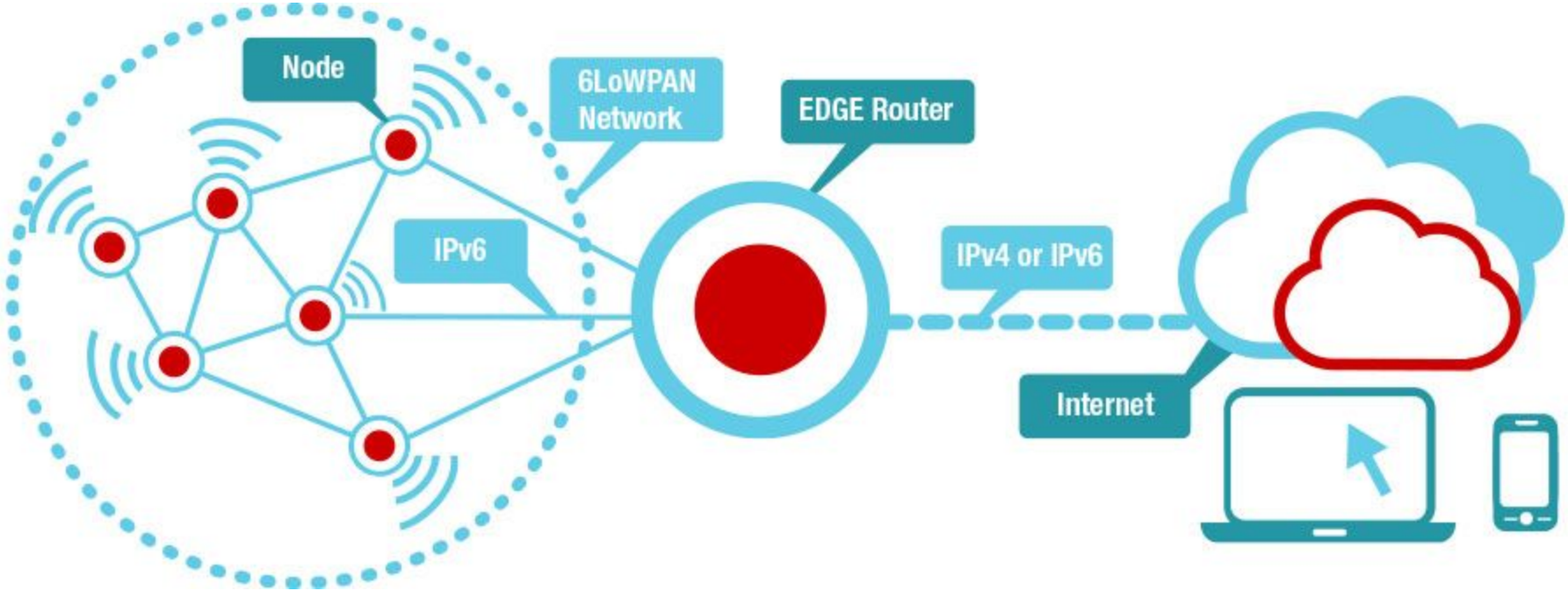
Figure 1—Star and peer-to-peer topology examples

Octets: 2	1	0/2	0/2/8	0/2	0/2/8	variable	2
Frame control	Sequence number	Destination PAN identifier	Destination address	Source PAN identifier	Source address	Frame payload	FCS
		Addressing fields					
MHR						MAC payload	MFR

Figure 34—General MAC frame format

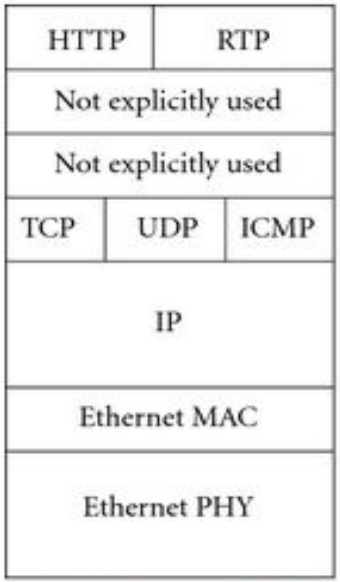
Introduction to 6LoWAPN

- 6LoWPAN is the latest version of the Internet Protocol (IPv6) and Low-power Wireless Personal Area Networks (LoWPAN).
- It has its own IPv6 address allowing it to connect directly to the internet derived by IETF(Internet Engineering Task Force) workgroup.
- 6LoWPAN has wireless sensor nodes (WSN) having IP communication capabilities.

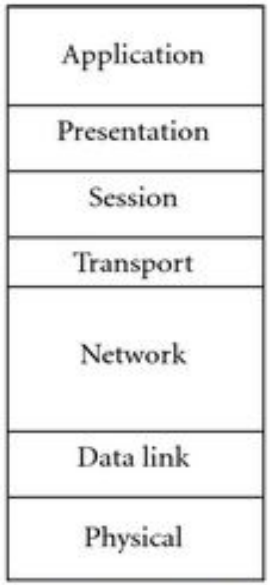

Node
6LoWPAN Network
EDGE Router
IPv6
IPv4 or IPv6
Internet

Features of 6LoWAPN

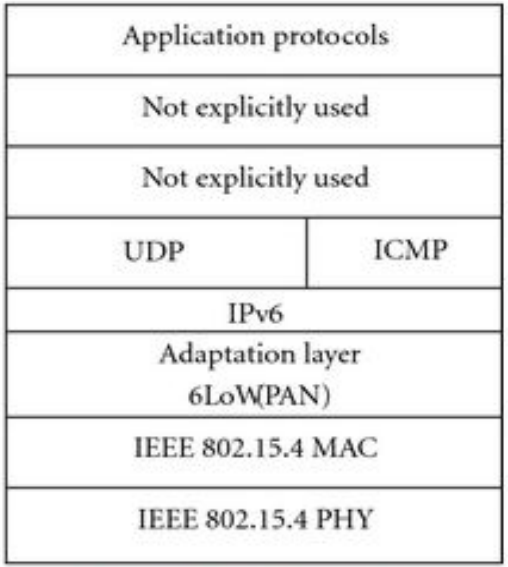
- Supports 64-bit and 16 –bit addressing.
- Designed for Low-power, Lossy IoT networks.
- Useful with low power link layers.
- Unicast, Multicast, Broadcast support.
- Support for IP routing.
- Allows direct connection between
- Supplementary adaptation layer is included.



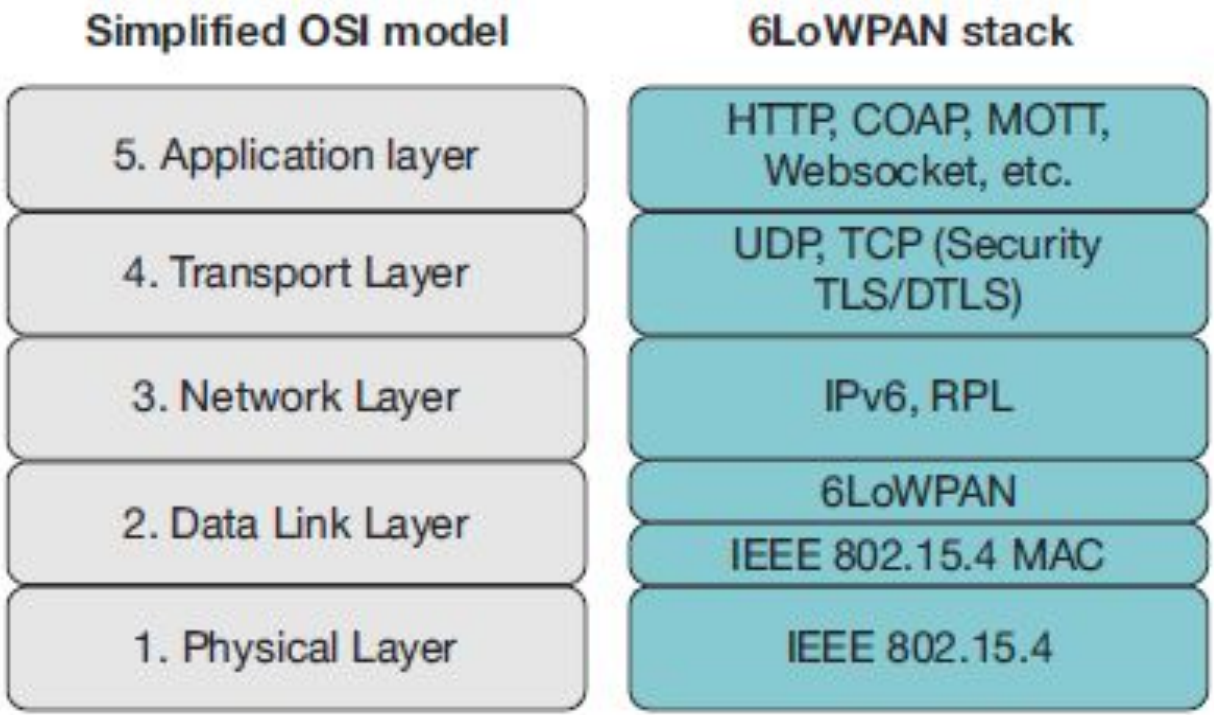
TCP/IP protocol stack



ISO/OSI layer



6LoWPAN protocol stack


Simplified OSI model
6LoWPAN stack
5. Application layer
4. Transport Layer
3. Network Layer
2. Data Link Layer
1. Physical Layer
HTTP, COAP, MOTT, Websocket, etc.
UDP, TCP (Security TLS/DTLS)
IPv6, RPL
6LoWPAN
IEEE 802.15.4 MAC
IEEE 802.15.4

Advantages:

Following are the benefits or **advantages of 6LoWPAN**:

➨6LoWPAN is a mesh network which is robust, scalable and self healing.

➨It offers long range of communication which detects signals below noise level.

➨It consumes less power as it uses reduced transmission time (using short time pulses). Hence this saves energy and consecutively battery can be used for very long duration.

➨It offers large network which can be used by millions of devices.

➨It delivers low cost and secure communication in IoT devices.

➨It offers one to many and many to one routing. Hence transparent internet integration is possible.

➨It uses IPv6 protocol and hence can be routed directly to cloud platforms.

Disadvantages

Following are the drawbacks or **disadvantages of 6LoWPAN**:

➨It is less secure than zigbee.

➨It has less immunity to interference than wifi or bluetooth devices.

➨It supports short range without mesh topology.