Wireless Standards – by Manoj Das

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Agenda

Different Standards bodies

Introduction and background IEEE standards with OSI reference model

IEEE 802 standards body

Wireless Networks (Thtoughput~ coverage comparison)

PAN, LAN, MAN, WRAN concept and comparison.

Ethernet Vs IEEE 802.3

Other IEEE Standards of Interest

Questions and curiosities ?

Common standards bodies

- **ITU (International Telecomunication Union)**: Regulates information and communication technology issues. It has four sections i.e ITU-T, ITU-R, ITU-D and ITU-Telecom. Below two are related to standards.
  - ITU-T (Telecomminucation): regulates telecom related standards
  - ITU-R (Radio) : Provides standards for wireless radio and Satellite

- **IETF (Internet engineering Task Force)**: Develops and promotes Internet standards (Issues RFCs for the Internet almost all layers of OSI)
- To download RFCs: http://www.rfc-editor.org/download.html

- **3GPP (3rd Generation Partnership Project)**: collaboration between groups of telecommunications associations which includes ETSI (The original GSM specs was issued by ETSI)

- **ICANN (Internet Corporation for Assigned Names and Numbers)**: Assigns Top Level Domain names such as (dot Com, dot org etc.) Also regulates IP address internationally.

- **IEEE (Institute of Electrical and Electronics Engineers)**
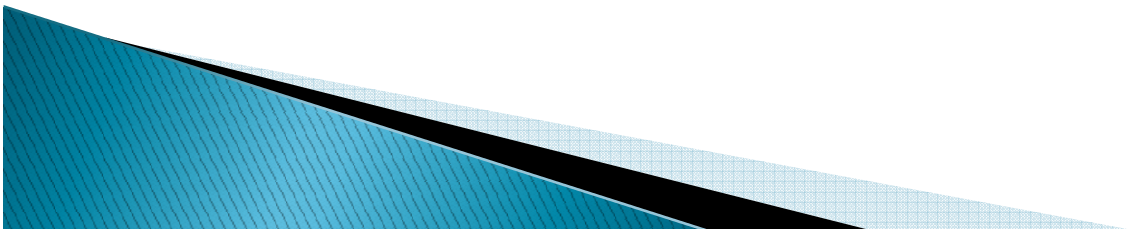
IEEE has more than 3100 standards published or in draft stage.

Standards range from Nuclear technology, Electromagnetics, Superconductivity, nano technology, manufacturing process, Power grid and lot more

OSI Reference Model

IEEE 802 overview

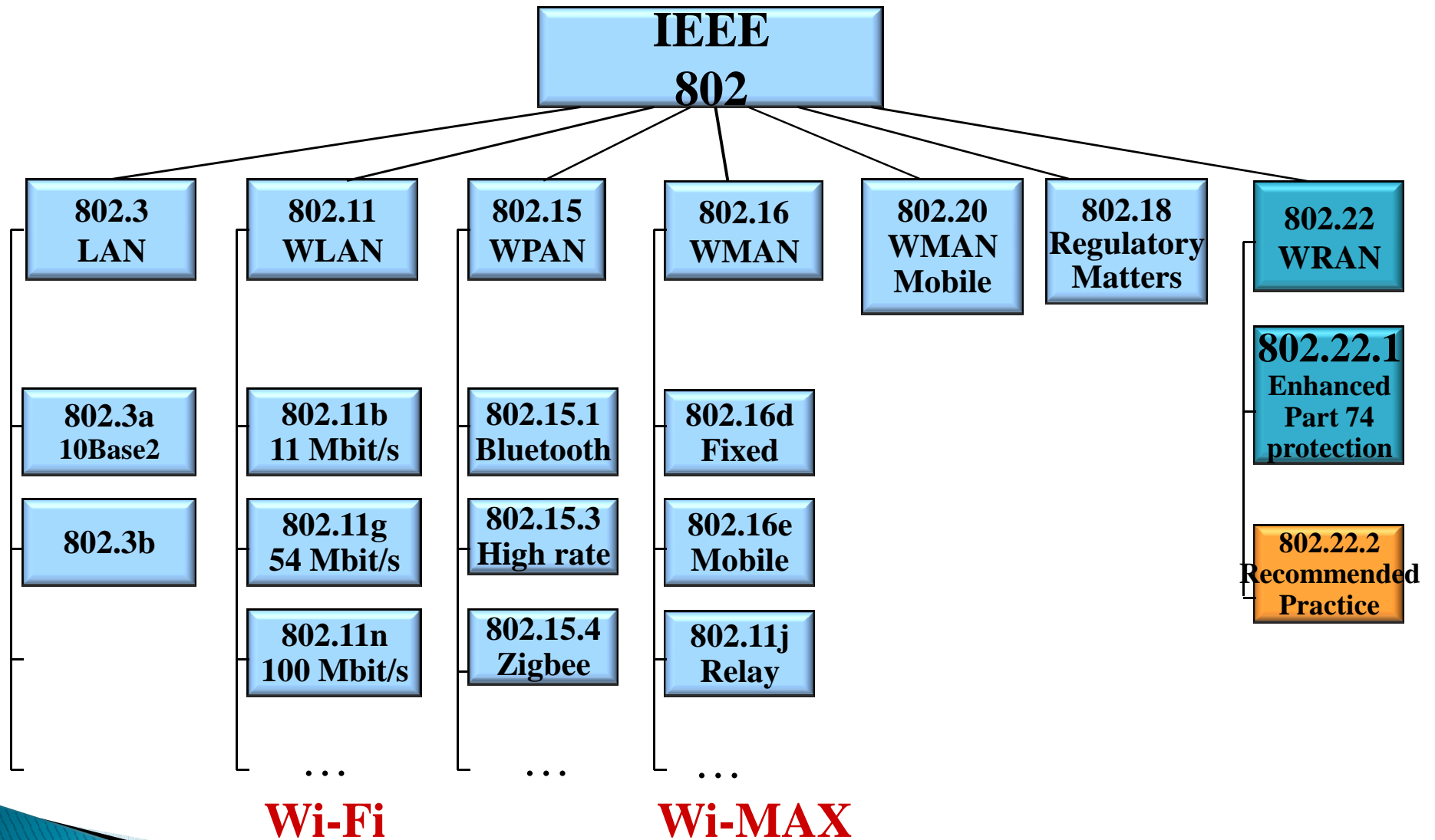| Application |
| Presentation |
| Session |
| Transport |
| Network |
| Data Link |
| Physcial |

- IEEE Project 802 LAN/MAN Standards Committee (IEEE 802 or LMSC)

  IEEE 802

  - Develop LAN and MAN standards
  - Mainly for link (MAC) and physical layers (PHY) of the network stack
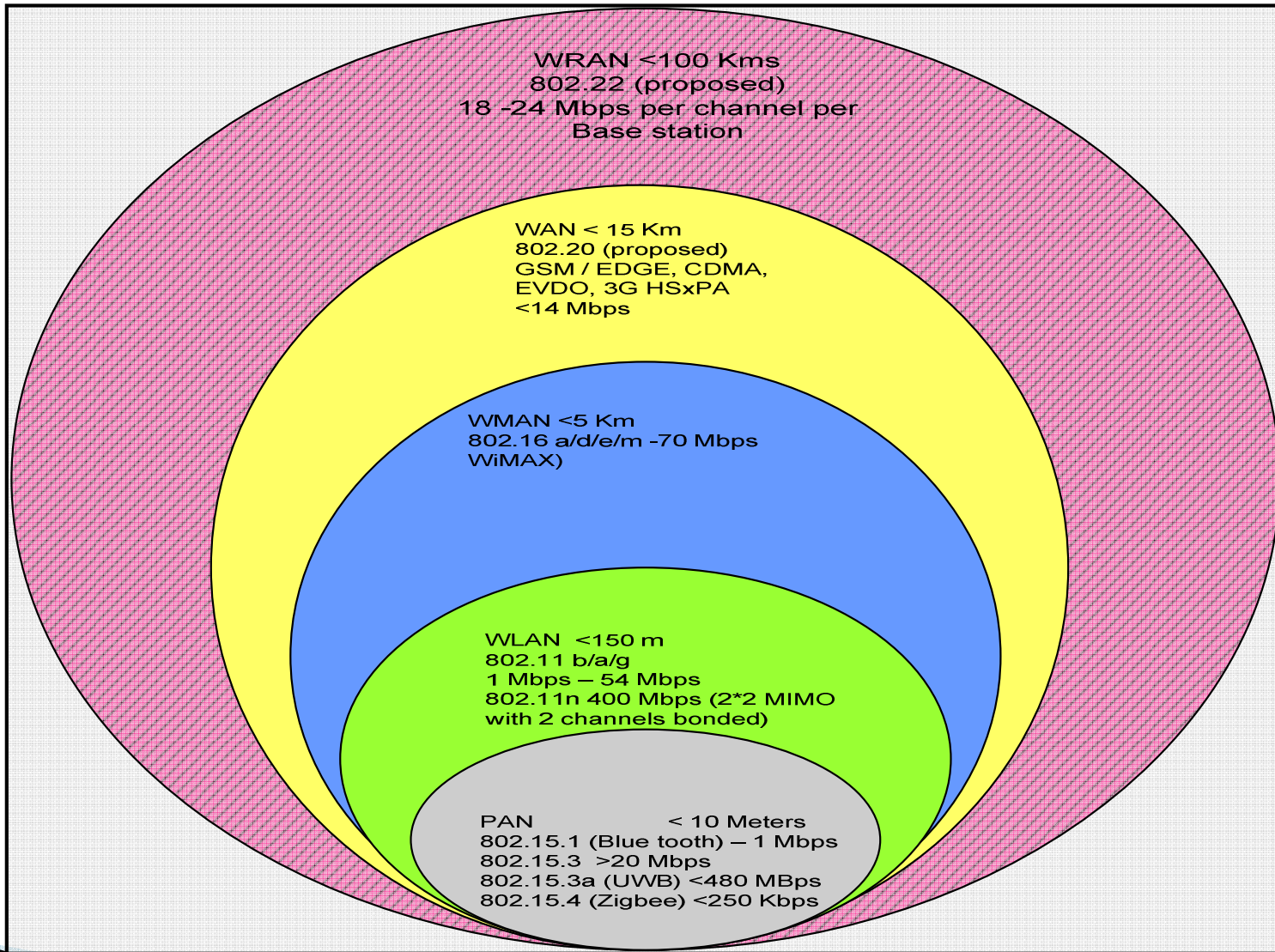
    Medium

  - In operation since March 1980
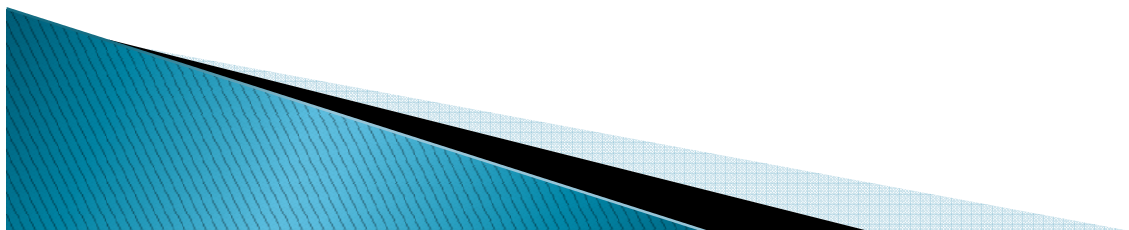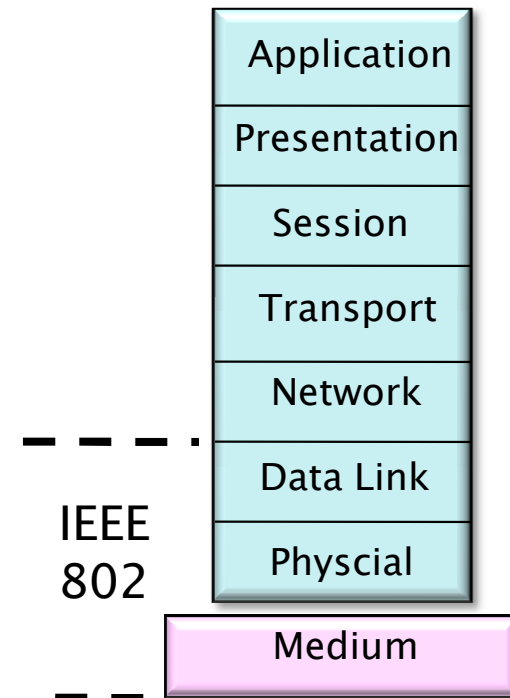
IEEE 802 Standards sections

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                        ┌─────────────┐
                        │    IEEE     │
                        │    802      │
                        └─────────────┘
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802.3 LAN	802.11 WLAN	802.15 WPAN	802.16 WMAN	802.20 WMAN Mobile	802.18 Regulatory Matters	802.22 WRAN

802.22.1
Enhanced
Part 74
protection

802.3a 10Base2	802.11b 11 Mbit/s	802.15.1 Bluetooth	802.16d Fixed			

802.3b	802.11g 54 Mbit/s	802.15.3 High rate	802.16e Mobile			802.22.2 Recommended Practice

	802.11n 100 Mbit/s	802.15.4 Zigbee	802.11j Relay			

… … …

Wi-Fi   **Wi-MAX**

Wireless networks (Throughput ~ coverage)

WRAN <100 Kms
802.22 (proposed)
18 –24 Mbps per channel per
Base station

WAN < 15 Km
802.20 (proposed)
GSM / EDGE, CDMA,
EVDO, 3G HSxPA
<14 Mbps

WMAN <5 Km
802.16 a/d/e/m –70 Mbps
WiMAX)

WLAN <150 m
802.11 b/a/g
1 Mbps — 54 Mbps
802.11n 400 Mbps (2*2 MIMO
with 2 channels bonded)

PAN   < 10 Meters
802.15.1 (Blue tooth) — 1 Mbps
802.15.3 >20 Mbps
802.15.3a (UWB) <480 MBps
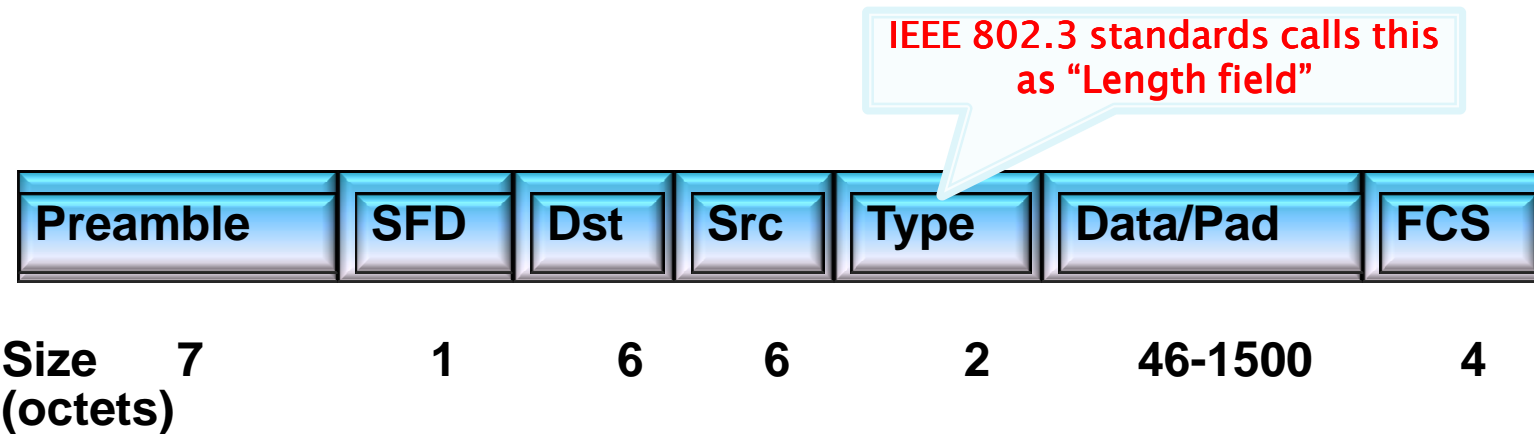802.15.4 (Zigbee) <250 Kbps

Wireless Networks comparison

Standard name	Access type	Data rate (aggregate per cell)	Cell radius	User type allowed	Handover capability	Frequency band
IEEE 802.15	WPAN	1 Mbps	30m	Fixed (LOS and NLOS), Nomadic	No	2.4 GHz
IEEE 802.11g/WiFi	WLAN	54Mbps	50–60 m	Fixed (LOS and NLOS), Nomadic	No	2.4 GHz
IEEE 802.11a/WiFi	WLAN	54 Mbps	50–60 m	Fixed (LOS and NLOS), Nomadic	No	5 GHz
IEEE 802.11n/WiFi	WLAN	Up to 300 Mbps (2X2 MIMO with 2 channels bonded)	50–60 m	Fixed (LOS and NLOS), Nomadic	No	2.4 GHz/ 5 GHz
IEEE 802.16/WiMAX	WMAN	36–135 Mbps for LOS, 75 Mbps for NLOS	Up to 70–80 km	Fixed (LOS and NLOS)	No	2–66 GHz
IEEE 802.16e/WiMAX	WMAN	30Mbps	Up to 70–80 km	Fixed (LOS and NLOS), Nomadic, Mobile	Yes	2–6 GHz
IEEE 802.20	WWAN	16 Mbps	>15 km	Fixed (LOS and NLOS), Nomadic, mobile, highly mobile	Yes	3.5 GHz
IEEE 802.22	WRAN	18 Mbps	>100 Kms	Fixed (LOS and NLOS)	No	54-862 MHz

Difference between Ethernet and IEEE802.3

Although Ethernet and IEEE802.3 used inter-changably, there is a very minor difference.

IEEE 802.3 standards calls this as "Length field"

Preamble	SFD	Dst	Src	Type	Data/Pad	FCS

Size (octets)	7	1	6	6	2	46-1500	4

In IEEE 802.3, the Type field is used as a Length field.

Addresses are generally (3) octets vendor code, (3) octets device number.
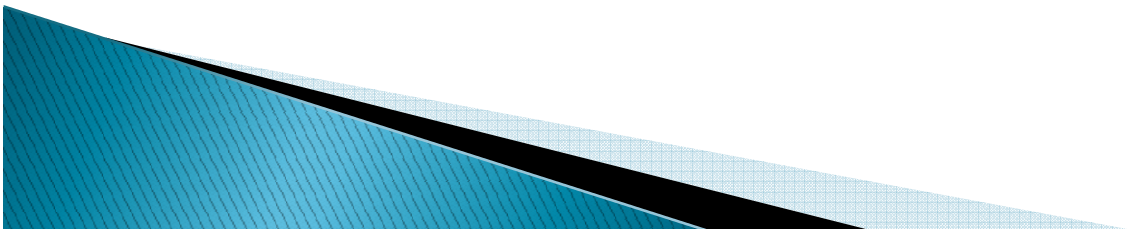
Other IEEE Standards of Interest

- IEEE P1901: Ethernet over Power line
- IEEE 802.21: Media Independent Hand Over
- IEEE 802.15.7: Visible Light Communication
- IEEE P2030: Smart grid
- IEEE 1394: ???

DISBANDED 802 standards
802.4 Token Bus
802.5 Token Ring
802.6 DQDB
802.7 Broadband TAG
802.8 Fiber Optic TAG
802.9 ISLAN
802.10 Security
802.12 Demand Priority
802.14 CATV

Questions and curiosities ?

When you get a chance please visit http://en.wikipedia.org/w/index.php?title=IEEE_802.22

Manoj updates this contineously with any updates after IEEE Standards Association voting

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