Network Infrastructure

STANDARDS AND EQUIPMENTS

WHAT YOU HAVE TO DO TO PREPARE A NETWORK LAYOUT FLOOR PLANS

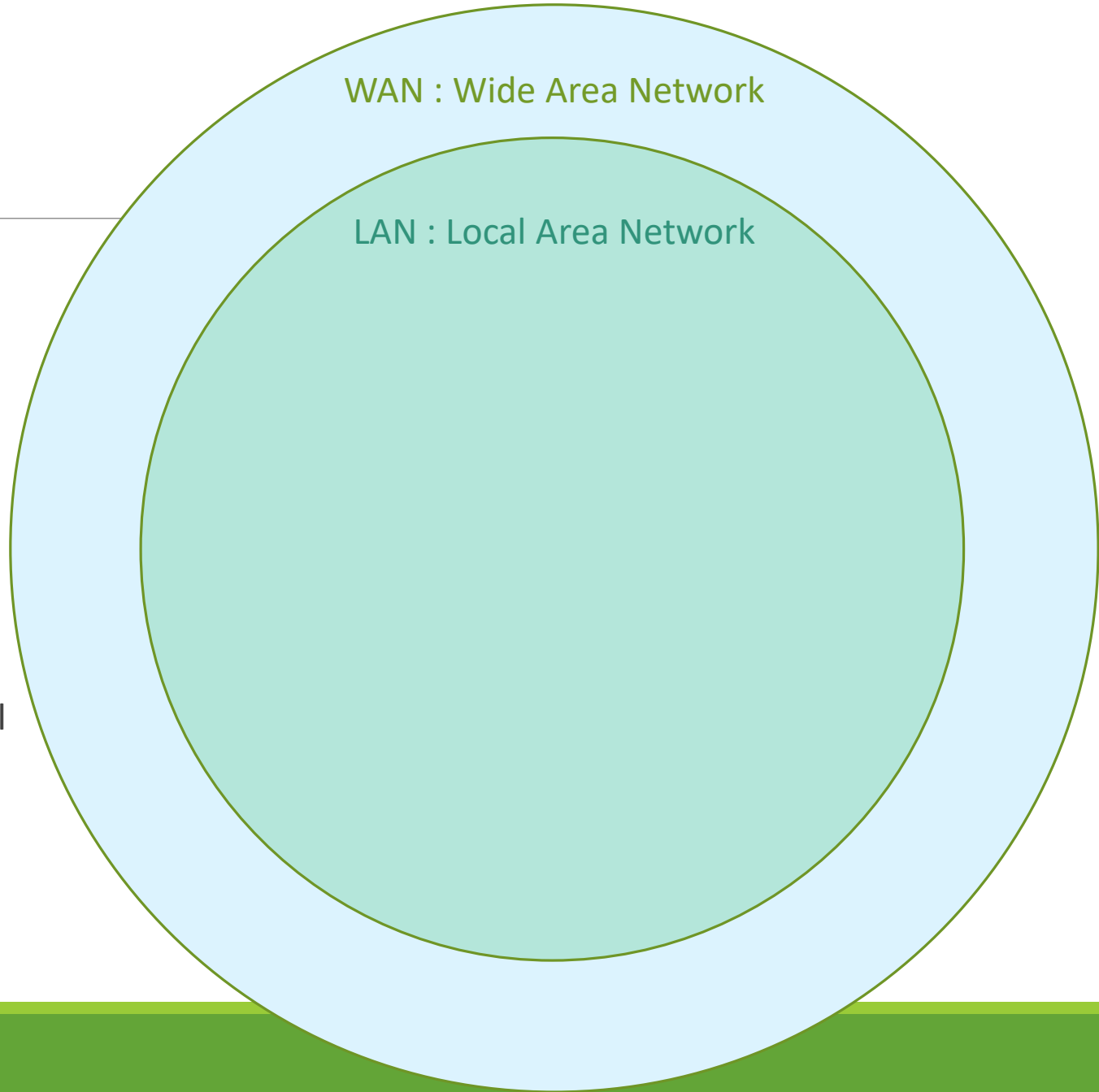
Different Kinds of Networks

WAN : large area

- For sensors networks
- For long distance communications between routers
- Media : Radio / Fiber optic / Power Line
- Distance Max : several kilometers to hundreds

LAN : local Area Network

- For communications between a set of connected devices (often computers, phone, TV ..) in a local area
- Media : Radio / Wires / Light
- Distance Max : hundreds of meters



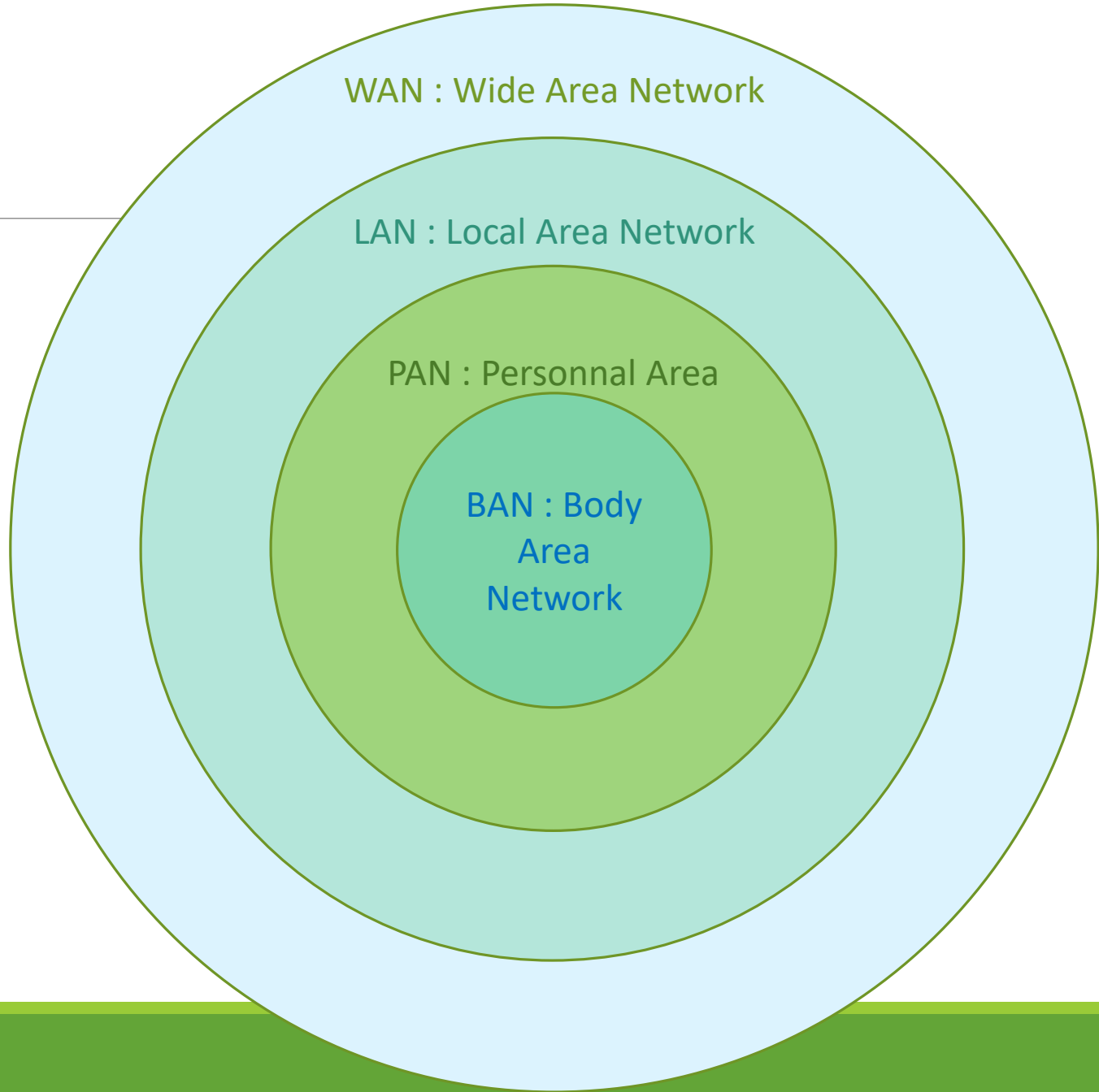
Different Kinds of Networks

PAN : Personnal Area

- For communications between a set of connected devices to a central equipment (often mouse, headset, speaker, keyboard, for computers, phones, TVs ..)
- Media : Radio / InfraRed
- Distance Max : tens of meters

BAN : Body Area

- Medical Networks
- Medium : Human Body



Something close to the WSI Reference Model for the Wireless World

This work has been partially sponsored by the European Commission within the 5th framework IST programme.

The WSI (see http://www.ist-wsi.org/) consortium consists of Ericsson (coordinator), Siemens, Nokia, Alcatel, as well as RWTH Aachen, Fraunhofer Fokus, University of Oulu and University of Surrey.

Figure 1: The WSI sphere model

B. From the vision of the wireless world to a reference model

Network Technologies

	Kind	Medium	Distance Max with intermediary equipment	Bandwith	Level of Power Consumption
Wifi	LAN	Radio			
Ethernet*	LAN	Copper Cable			
Power Line Communications	LAN	Copper Cable			
Lifi	LAN	Light			
Cellular Network (3G, 4G, GSM)	WAN	Cellular Radio Network			
Satellite Network	WAN	Radio			
LoRa	WAN	Radio			Low Power
SigFox	WAN	Radio			Low Power
Zigbee	WAN	Radio			Low Power
Bluetooth	PAN	Radio			
IrDa (InfraRed)	PAN	InfraRed Light			
ATM/Fiber optic	WAN	Fiber optic			
ADSL / Local Loop	WAN	Copper Cable			

* Various standards

Ethernet … various standards

Various type of Cabling

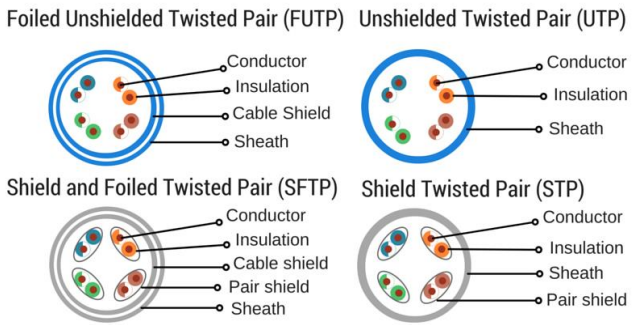
Various Data Rate

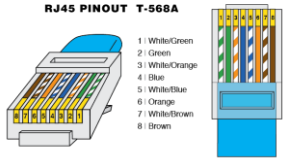
Various Equipment

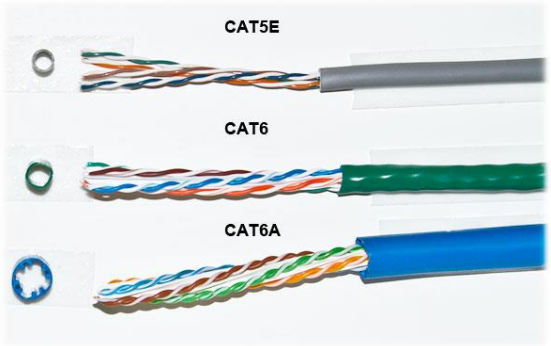
The Evolution of Ethernet Standards to Meet Higher Speeds				
Date	**IEEE Std.**	**Name**	**Data Rate**	**Type of Cabling**
1990	802.3i	10BASE-T	10 Mb/s	Category 3 cabling
1995	802.3u	100BASE-TX	100 Mb/s*	Category 5 cabling
1998	802.3z	1000BASE-SX	1 Gb/s	Multimode fiber
	802.3z	1000BASE-LX/EX		Single mode fiber
1999	802.3ab	1000BASE-T	1 Gb/s*	Category 5e or higher Category
2003	802.3ae	10GBASE-SR	10 Gb/s	Laser-Optimized MMF
	802.3ae	10GBASE-LR/ER		Single mode fiber
2006	802.3an	10GBASE-T	10 Gb/s*	Category 6A cabling
2015	802.3bq	40GBASE-T	40 Gb/s*	Category 8 (Class I & II) Cabling
2010	802.3ba	40GBASE-SR4/LR4	40 Gb/s	Laser-Optimized MMF or SMF
	802.3ba	100GBASE-SR10/LR4/ER4	100 Gb/s	Laser-Optimized MMF or SMF
2015	802.3bm	100GBASE-SR4	100 Gb/s	Laser-Optimized MMF
2016	SG	Under development	400 Gb/s	Laser-Optimized MMF or SMF
Note: *with auto negotiation				

Different type of cabling

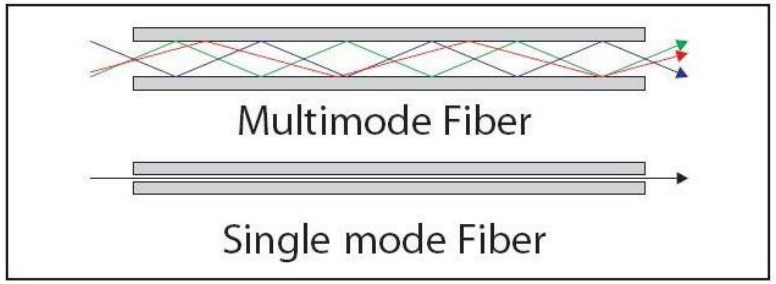
Copper cables CAT X.y (FUTP, UTP, SFTP, STP)

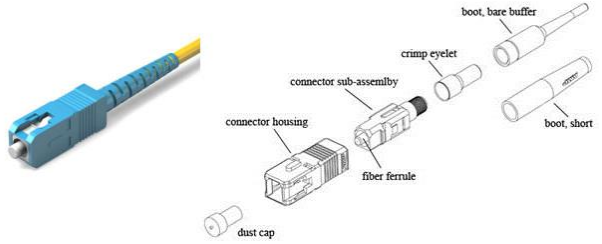






Laser optimized SMF -MMF

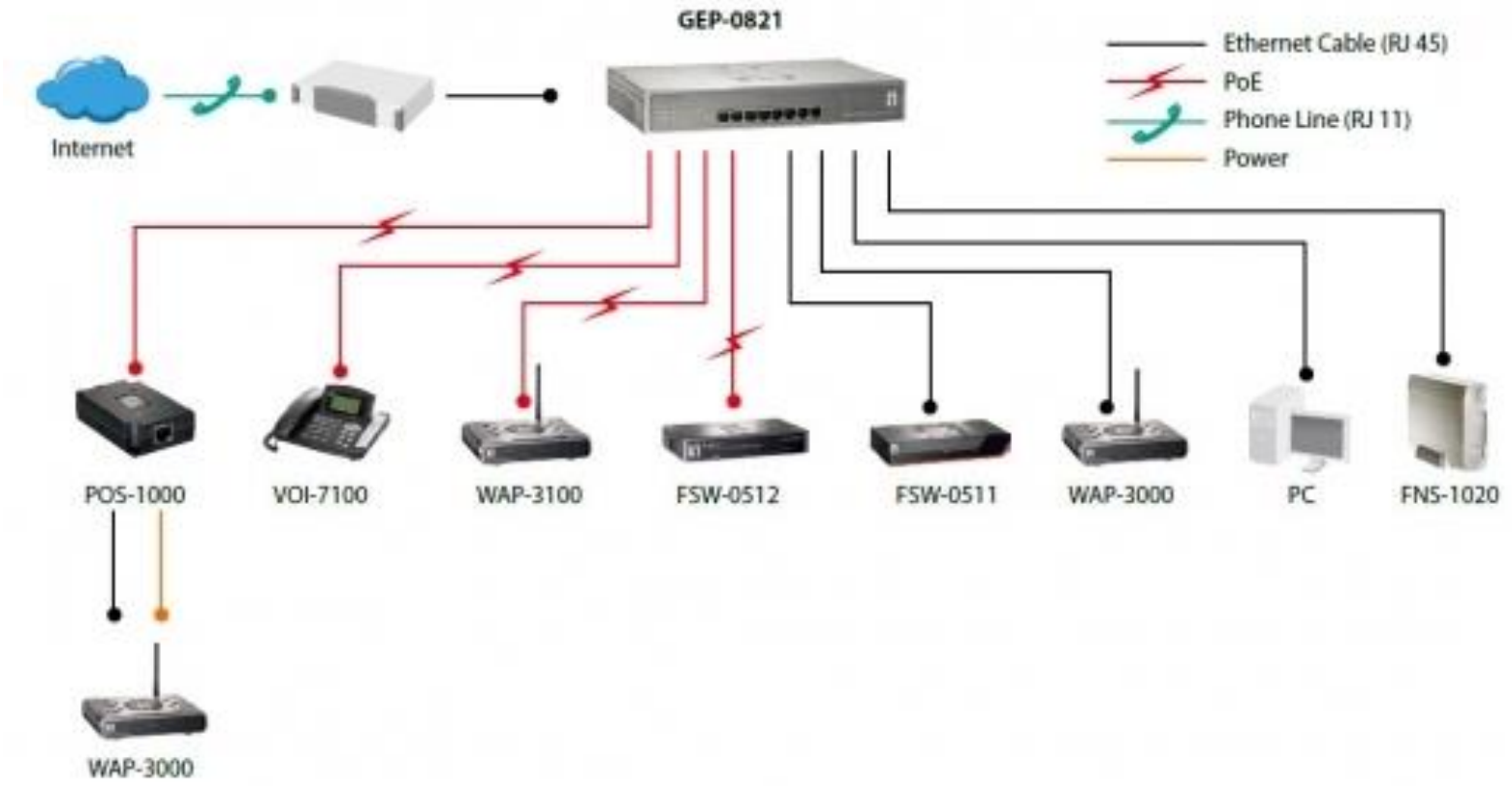




Switches between ethernet connections

Ethernet Cables

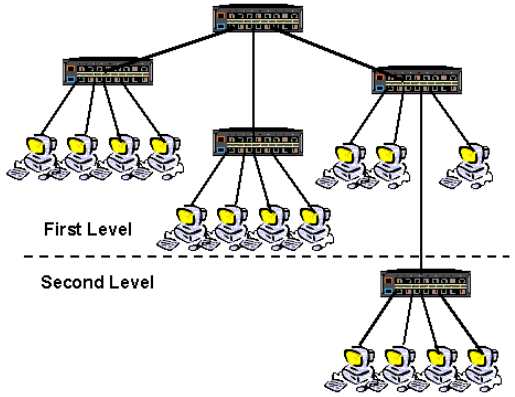
PoE (Power over Ethernet)



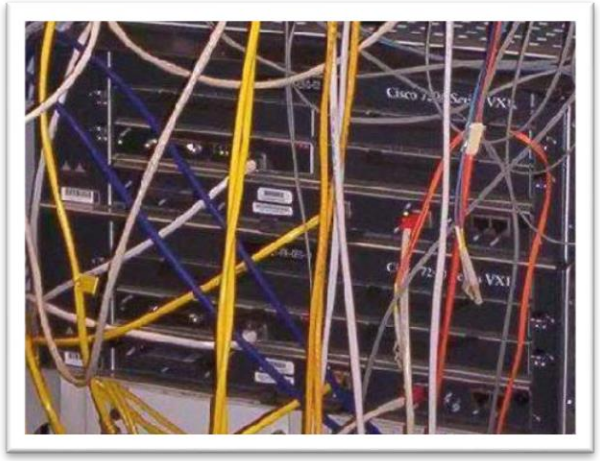
Ethernet Switch

A Specific Gateway : From Ethernet to Ethernet

How to use them ?



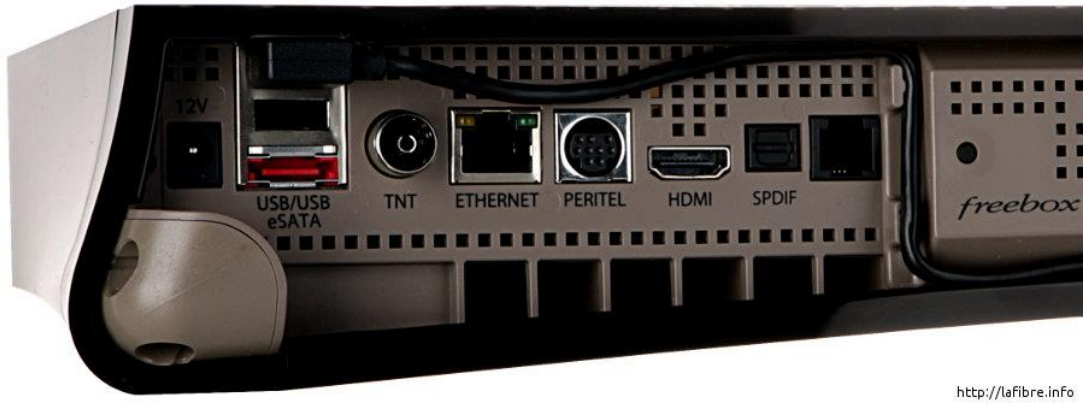
Because it may be a mess



Patch Bay

Internet Provider (ISDN) Box

EXAMPLE FREEBOX



PLUGS AND NETWORK TECHNOLOGIES

Ethernet (5 + 1 plugs RJ45)

Telephone (input / output – RJ10)

SPDIF (Fiber optic)

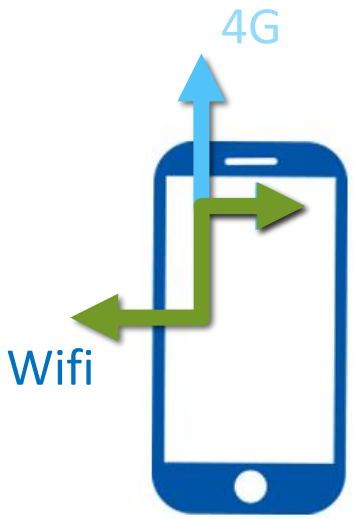
Others plugs for non network technologies :
TNT (Coaxial Cable) / Peritel / USB/SATA

Box, Gateway, etc...

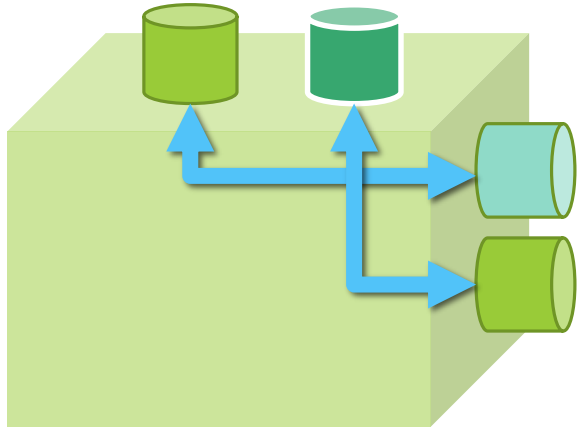
In fact this a way to interconnect various different technologies.

This is a Router (Layer 3) + Modem (Layer 2-1)

Example :



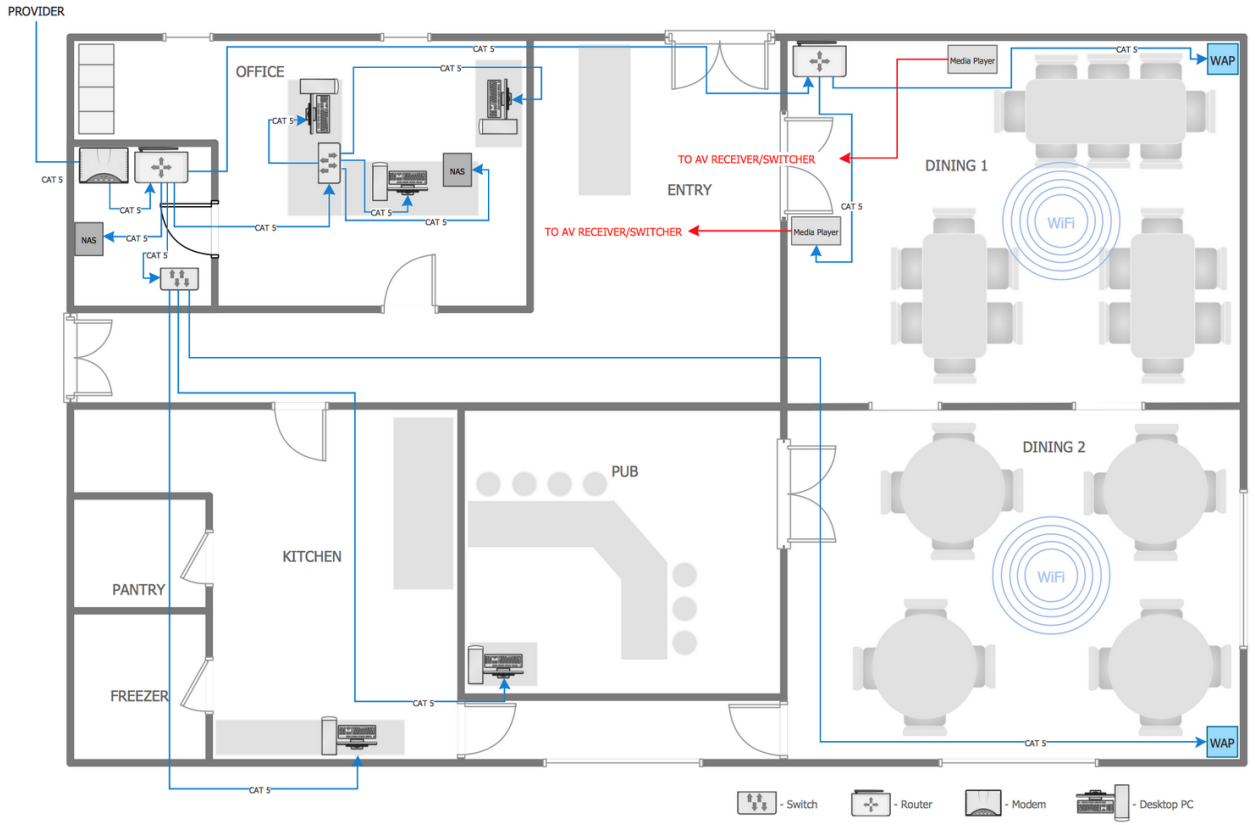
A generic representation of a Gateway is :



Network Layout Floor Plans

With ConceptDraw

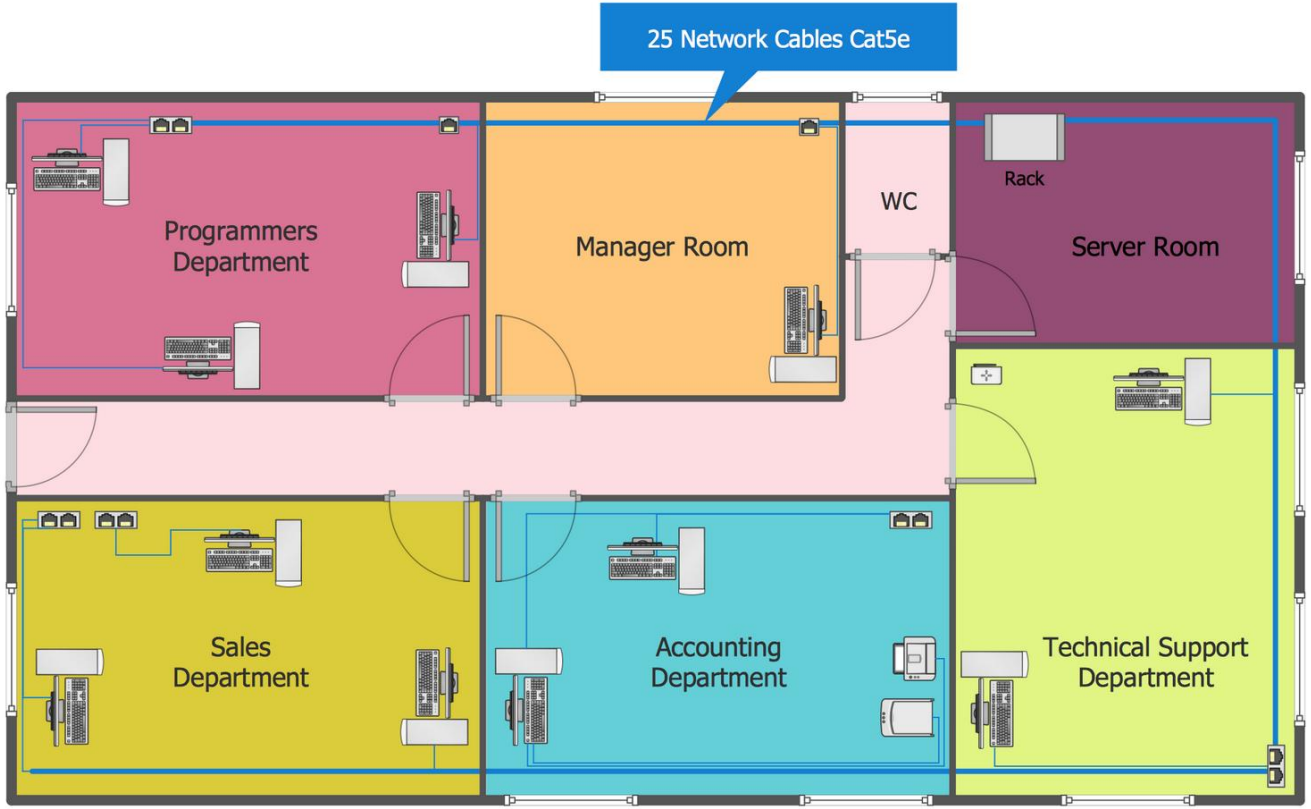
http://www.conceptdraw.com/solution-park/computer-networks-layout-floor-plans



Network Layout Floor Plans

With ConceptDraw

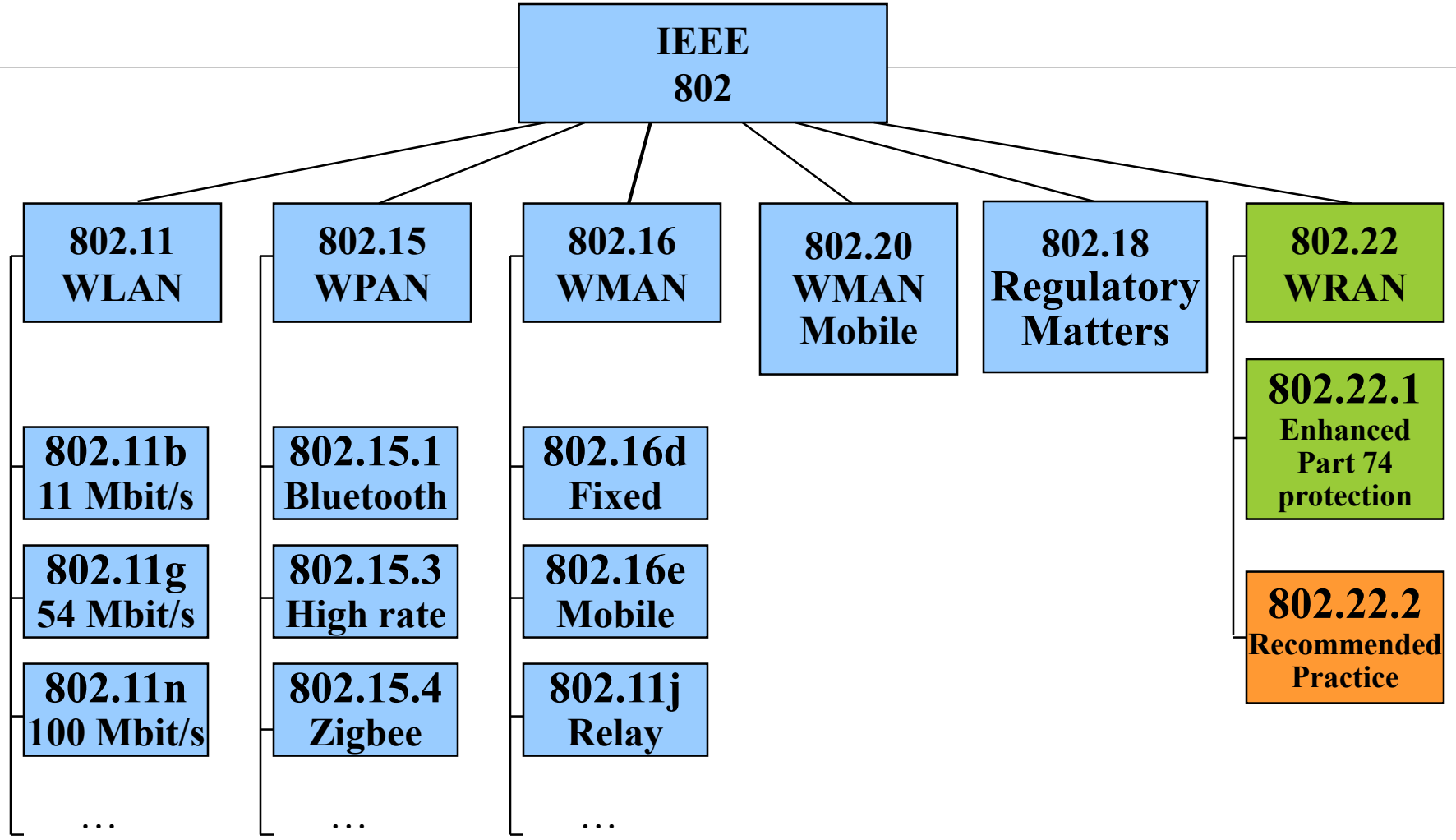
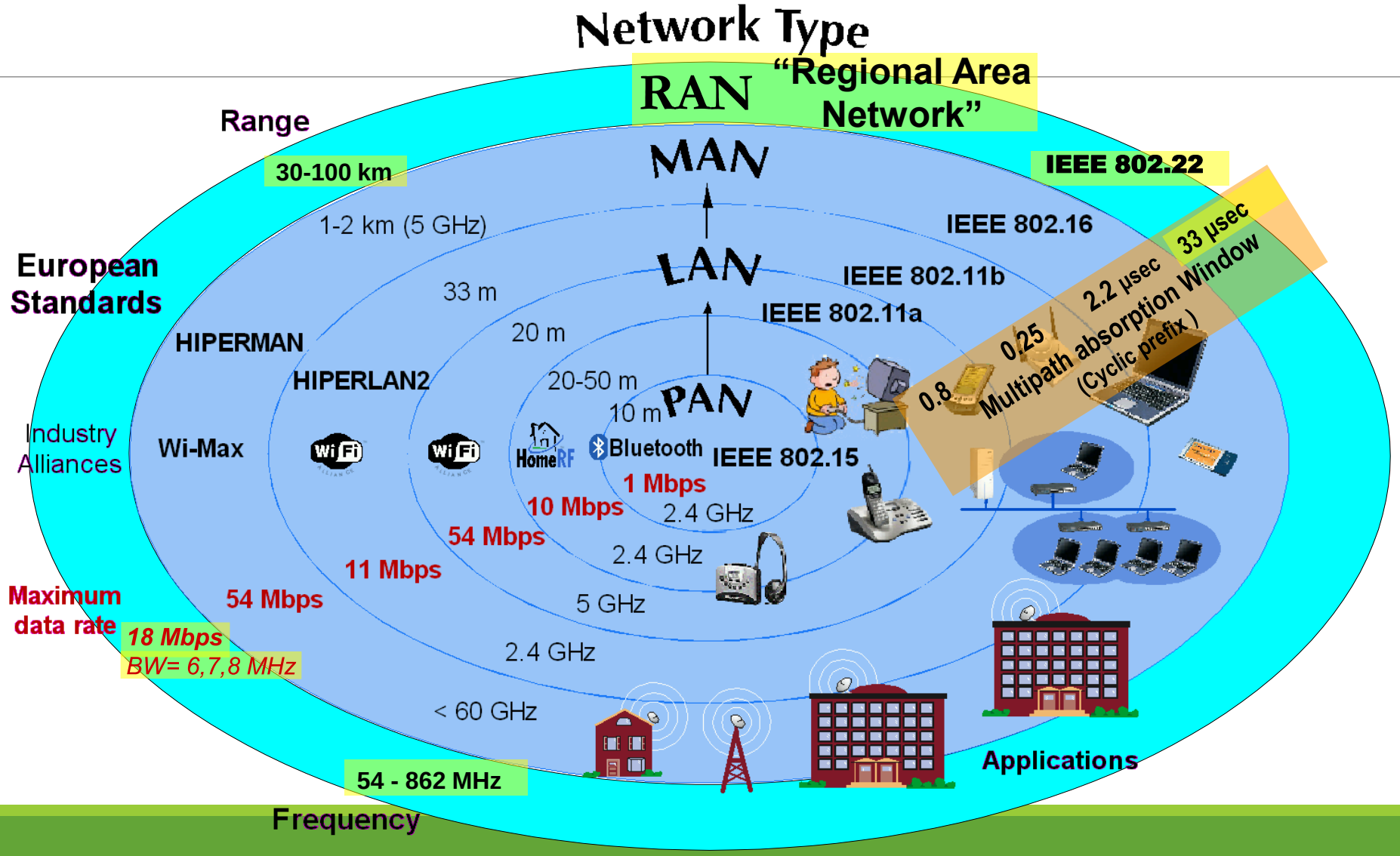
http://www.conceptdraw.com/solution-park/computer-networks-layout-floor-plans



Appendices

IEEE 802 STANDARDS

IEEE 802 Standards Process



IEEE Standards