



A Need of Information Security for Network Infrastructure

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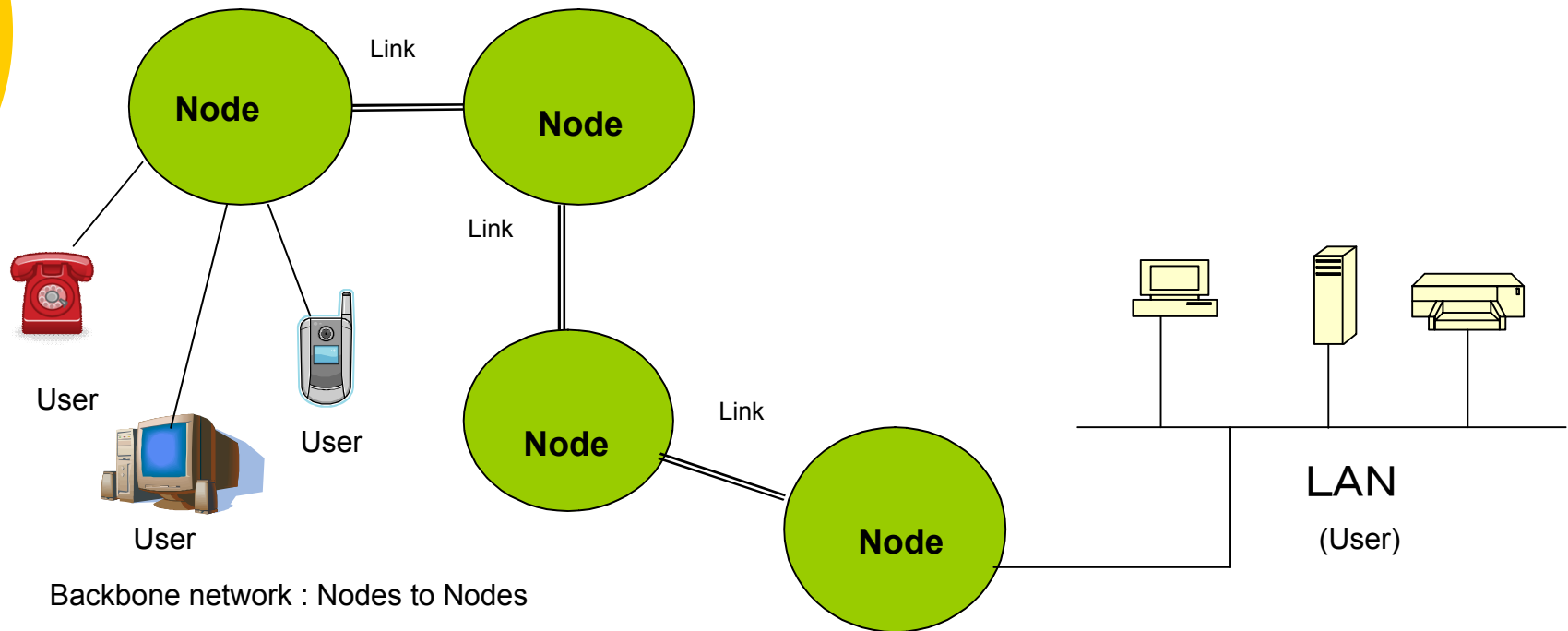
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What is Telecommunication Network

Telecommunication Network = Links + Node



Backbone network : Nodes to Nodes

Access network : Node to Users

OSI and Network Infrastructure

○ **OSI (Open System Interconnection Basic Reference Model):**

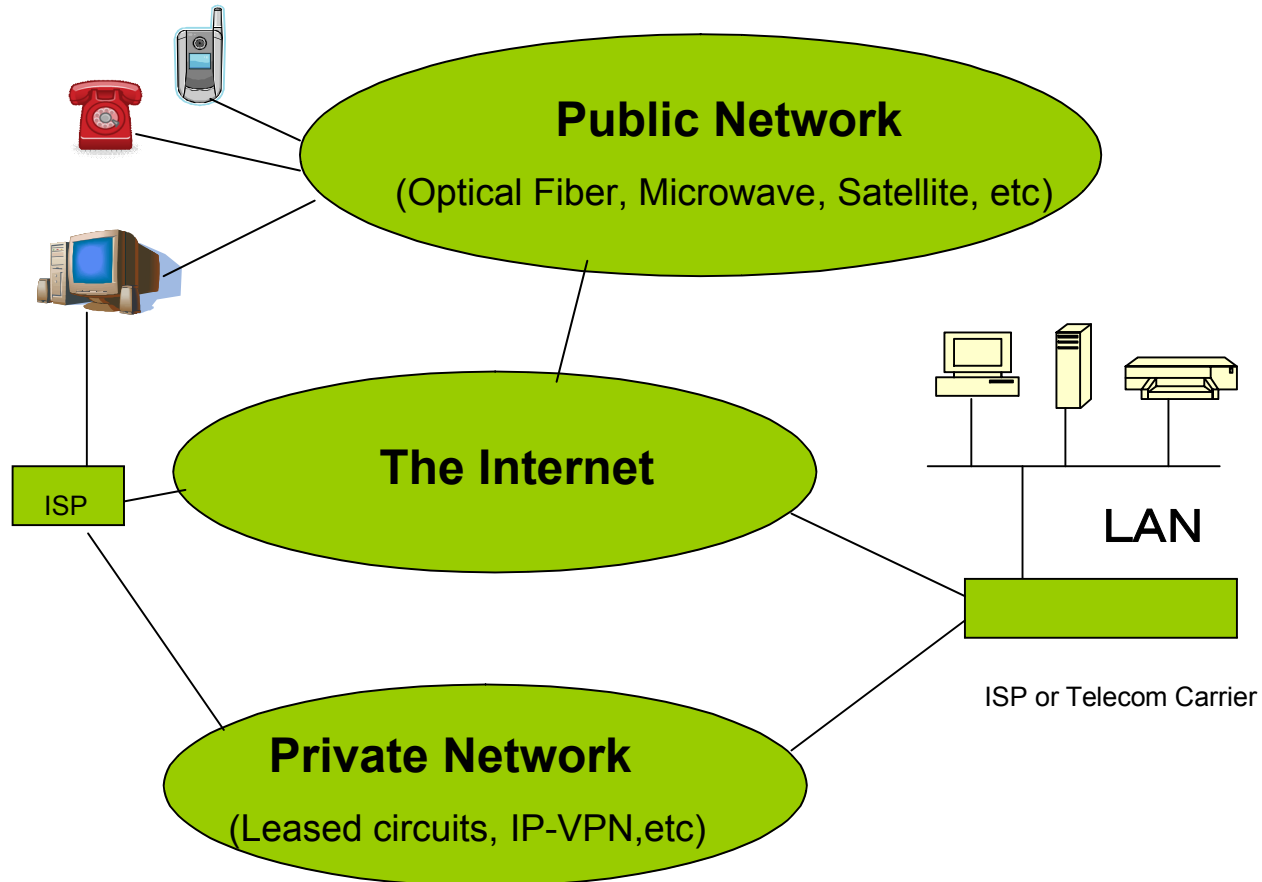
Design policy of data network architecture between different types of computers

○ **Network infrastructure:**

Network infrastructure is indicated as media layers of the right table. However, it is also referred to as physical layers for transmission in a limited sense.

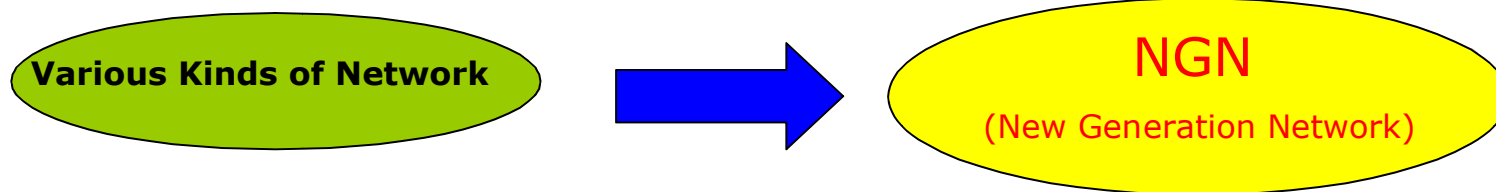
OSI Reference Model			
	Data Unit	Layer	Function
Host layers	Data	7.Application	Network process to application
		6.Presentation	Data representation and encryption
		5.Session	Interhost communication
	Segment Datagram	4.Transport	End to end connections and reliability (TCP)
Media layers	Packet	3.Network	Patch determination and logical addressing
	Frame	2.Data link	Physical addressing (MAC & LLC)
	Bit	1.Physical	Media, signal and binary transmission

Category of Network

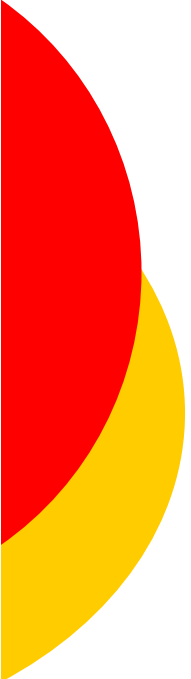


Classification of Network

Classification	Description of system
Service	Public telephone, Data communication , Facsimile service, Computer communication, Personal computer communication, Mobile phone
Function	Public Switched Telephone Network (PSTN), Packet switched network, Leased lines
Technology	Analogue network, Digital network, SDH network, Satellite communication, IP packet network



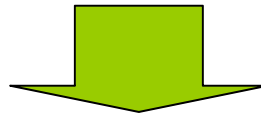
Backbone and Access Network

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- A decorative graphic on the left side of the slide consists of two overlapping semi-circles. The top semi-circle is red, and the bottom semi-circle is yellow. They are positioned on the left edge of the slide, partially cut off by the border.
- **Backbone** :between Node and Node
 - Metallic cable
 - Optical fiber cable (ATM, DWDM, CWDM)
 - Microwave radio system
 - Satellite communication system
 - **Access Line** :between Node and User
 - Metallic cable (Voice, ISDN, ADSL)
 - Optical Fiber Cable (FTTH, FTTC, FTTB)
 - Wireless Access System (WLL, Wi-Fi, WiMAX)
 - Mobile-Phone System (GSMC, 3G CDMA)

Security Measures for Network

□ Concept of Security

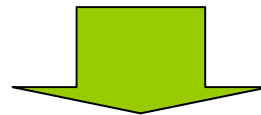
- Confidentiality : *Leakage of information shall be protected to unacceptable party*
- Integrity : *Control and maintenance of information shall be kept*
- Availability : *Effective use of information shall be kept*



□ Physical security measures : Hardware

□ Logical security measures : Computer Security with software

□ Human security measures : Operation & Maintenance (Policy and Manual), : Attention to users/operator

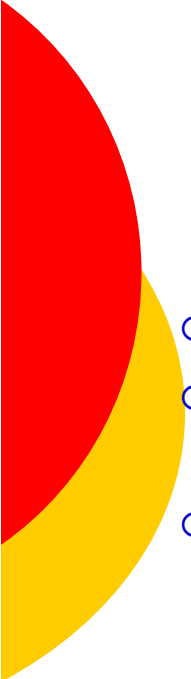


□ Reliability of network infrastructures

Classification of Risks and Damages

Risk Factor	Description	Damage
External aggression	DoS (Denial of Service)	Server break down, suspension of business
	Unauthorized access	Tapping, leak and tampering of information
	Malware	System break down, Virus infection, The Trojan horse (Trojan code), The Internet bots
Internal leak of information	Wiretapping and/or leakage	Spilling out information carelessly
Disappearance and blocking of Information due to system failure	System/equipment clash Natural disaster (earthquake, flood, fire) Man-made accident	Information loss
Invalid operation for e-Commerce	Masquerading, spoofing and/or Phising	Loss of money as result of invalid access

Security for Network (System and Components)

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- Preparation for stand-by system and components in network
 - Preparation of emergency power source such as fixed engine generator or mobile engine generator
 - Preparation of back-up lines in back-bone network
 - Route diversity (Physical diversity)
 - Cable route and Wireless route (microwave, satellite)
→Media diversity
 - Use of plural telecom carriers' lines
 - Applying both leased circuits and the Internet
 - Fire precautions, quakeproof and staunch structure (floor load) in equipment room/building design
 - Preparation of measures (electric shielding) against electromagnetic induction and/or electrostatic induction to copper cable, components and equipment

Security of OSP considering Natural Environment

OSP (Outside Plant) means network facilities installed outside of telecom buildings such as cable, distribution terminals and cable conduits including antenna and its tower.

OSP	Aerial Cable	Under-ground cable	Cable Conduits	Antenna tower
Enviro.				
Temperature	◎	△	△	△
Sunshine	◎	X	X	△
Humidity	◎	△	△	X
Rainfall	○	◎	△	X
Wind	◎	X	X	◎
Snow	◎	X	X	○
Lightning	◎	X	X	◎
Briny air	◎	X	X	○
aerial pollution	◎	X	X	○
Hot spring	◎	X	X	
Harmful birds, insects & animals	◎	X	X	X
earthquake	◎	○	○	◎
Grand sinkage	○	◎	◎	○
Land slide	○	◎	◎	○
Rock fall	○	X	X	X

◎:strongest ○:stronger △:OK X: not strong



- Selection of :**
- Material
 - System
 - Construction Method
 - O & M

Security and Reliability on OSP

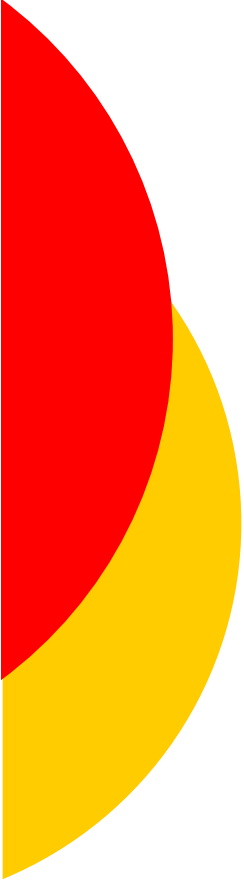
○ Construction Period

- Proper Design (For example)
 - Avoid power line contact to network
 - Keep a certain distance between aerial cable
 - Proper grounding, whenever needed
- Proper materials
- Documentation (As-built drawings, O&M Manual, etc)
- Site investigation for hidden spots and taking photo evidence
- Confirmation for completion of work at site and recording results

○ O&M Period

- Establishment of an O&M team and center
- Regular patrol
- Watching and caution to the third parties' construction sites
- O&M measuring and test equipment such as OFC supervisory system

○ **Even if outsourcing for O&M, a proprietor should be aware of essential aspects of OSP and O&M work**



Hoping you to understand that network infrastructure (Physical part) is also one of essential aspects in the information security

Thank you for working with us today!