

Introduzione alle Reti di TLC

Claudio Bovo

Capire la rete: **L'infrastruttura**

Vantaggi della rete:

- Condivisione di risorse
- Sicurezza dei dati
- Comunicazione

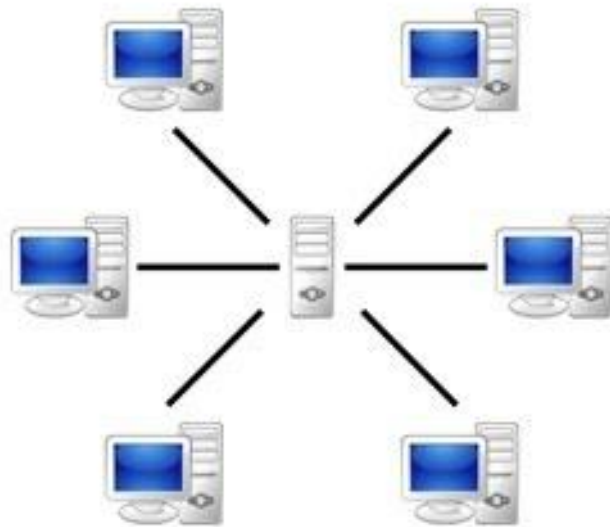
Capire la rete: **L'infrastruttura**

Architetture client-server/ peer to peer

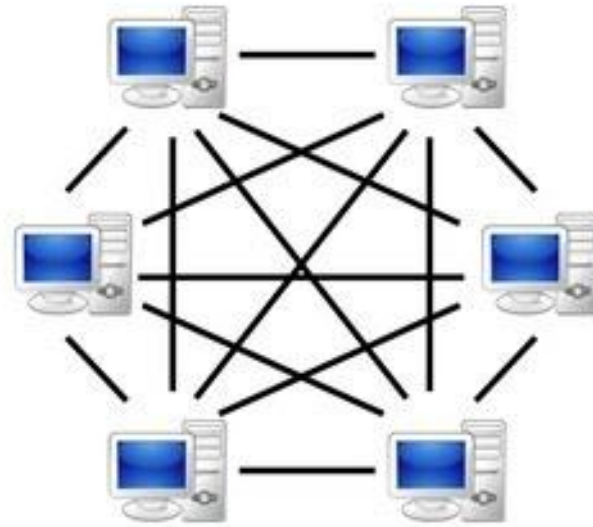
- Client= chiede servizio
- Server= offre servizio

Capire la rete: **L'infrastruttura**

Architetture client-server/ peer to peer



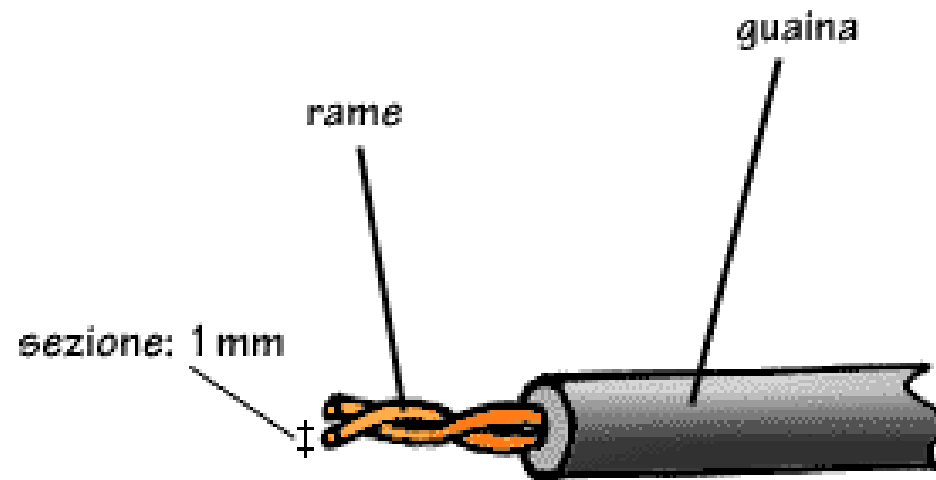
Server-based



P2P-network

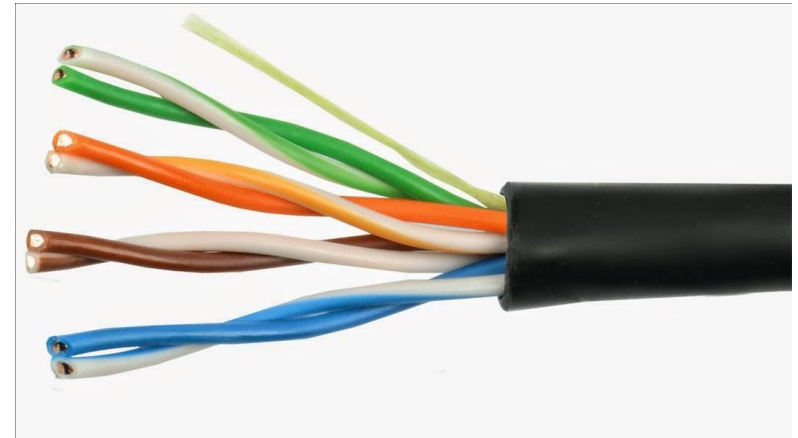
Capire la rete: L'infrastruttura

Mezzi trasmissivi: il doppino telefonico



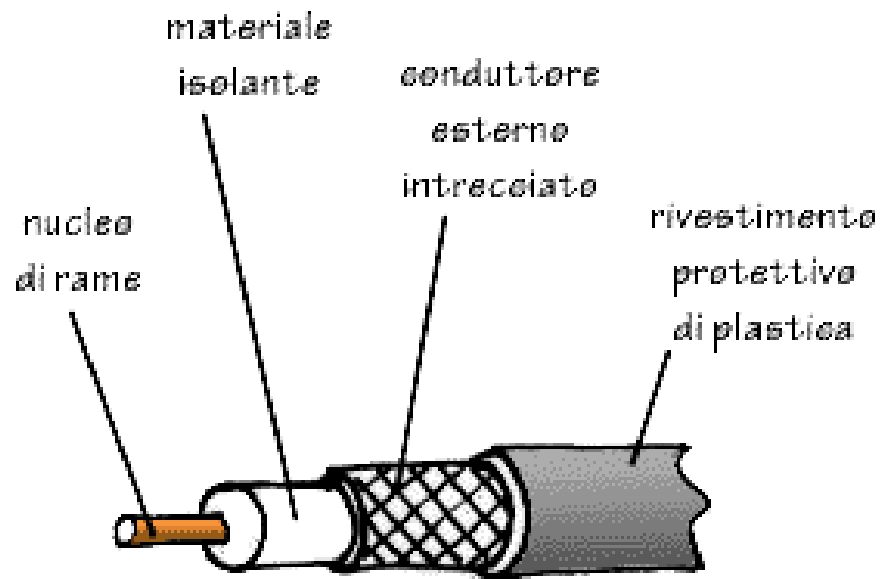
Capire la rete: L'infrastruttura

Mezzi trasmissivi: il doppino telefonico



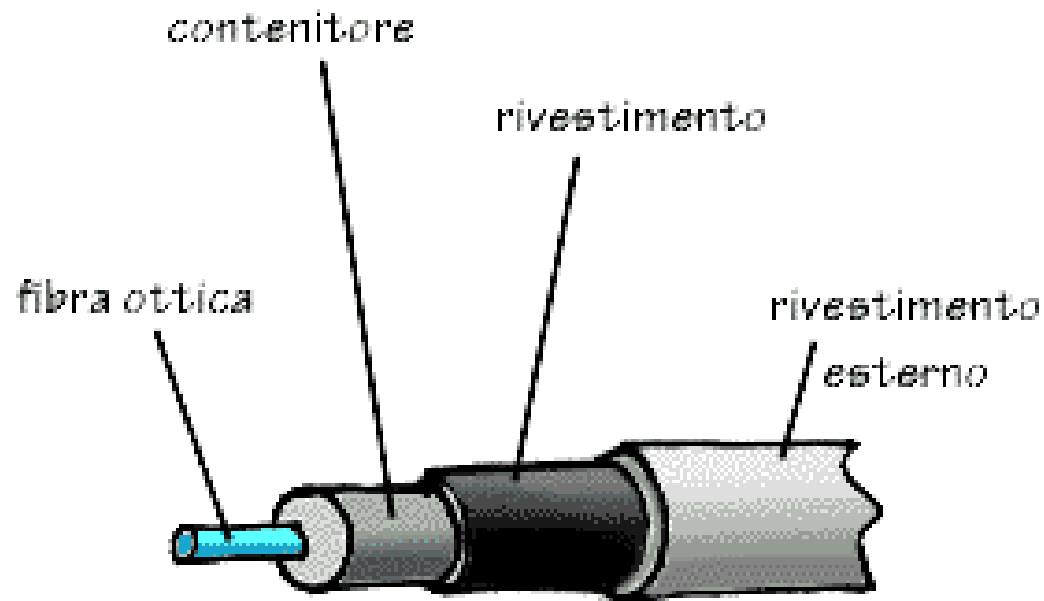
Capire la rete: L'infrastruttura

Mezzi trasmissivi: il cavo coassiale



Capire la rete: L'infrastruttura

Mezzi trasmissivi: la fibra ottica



Capire la rete: L'infrastruttura

Mezzi trasmissivi: le reti wireless



Capire la rete: **L'infrastruttura**

Mezzi trasmissivi: le reti wireless

WiFi WiMax EoloWave LTE 4G
Bluetooth Rfid

Hedy Lamarr, stella di Hollywood (1914-2000)



Hedy Lamarr, stella di Hollywood



If it wasn't for Hedy
Lamarr, we wouldn't
have Wi-Fi and
Bluetooth

Hedy Lamarr, stella di Hollywood



At the beginning of World War II, with composer George Antheil, Lamarr developed **spread spectrum and frequency hopping technology** to defeat the threat of jamming Allied guided torpedoes by the Axis. Though the US Navy did not adopt the technology until the 1960s, the principles of their work are now incorporated into modern Wi-Fi, CDMA and Bluetooth technology, and this work led to her being inducted into the National Inventors Hall of Fame in 2014.

[Fonte: Wikipedia](#)

Capire la rete: **L'infrastruttura**

Mezzi trasmissivi: le reti wireless

Il mercato Bluetooth nei prossimi 5 anni (Fonte: Studio Frost & Sullivan)

- Il 65,6% (precisamente 6,4 Milioni di pezzi) dei Palmari consegnati nel 2002 sarà equipaggiato di dispositivi Bluetooth. Dal 2004 tutti i Palmari saranno dotati di Bluetooth.
- Entro il 2006 il 78,8% delle Soluzioni per Desktop (Scanner, Stampanti, ecc...) saranno basate sulla tecnologia Bluetooth. .

Capire la rete: **L'infrastruttura**

Mezzi trasmissivi: le reti wireless

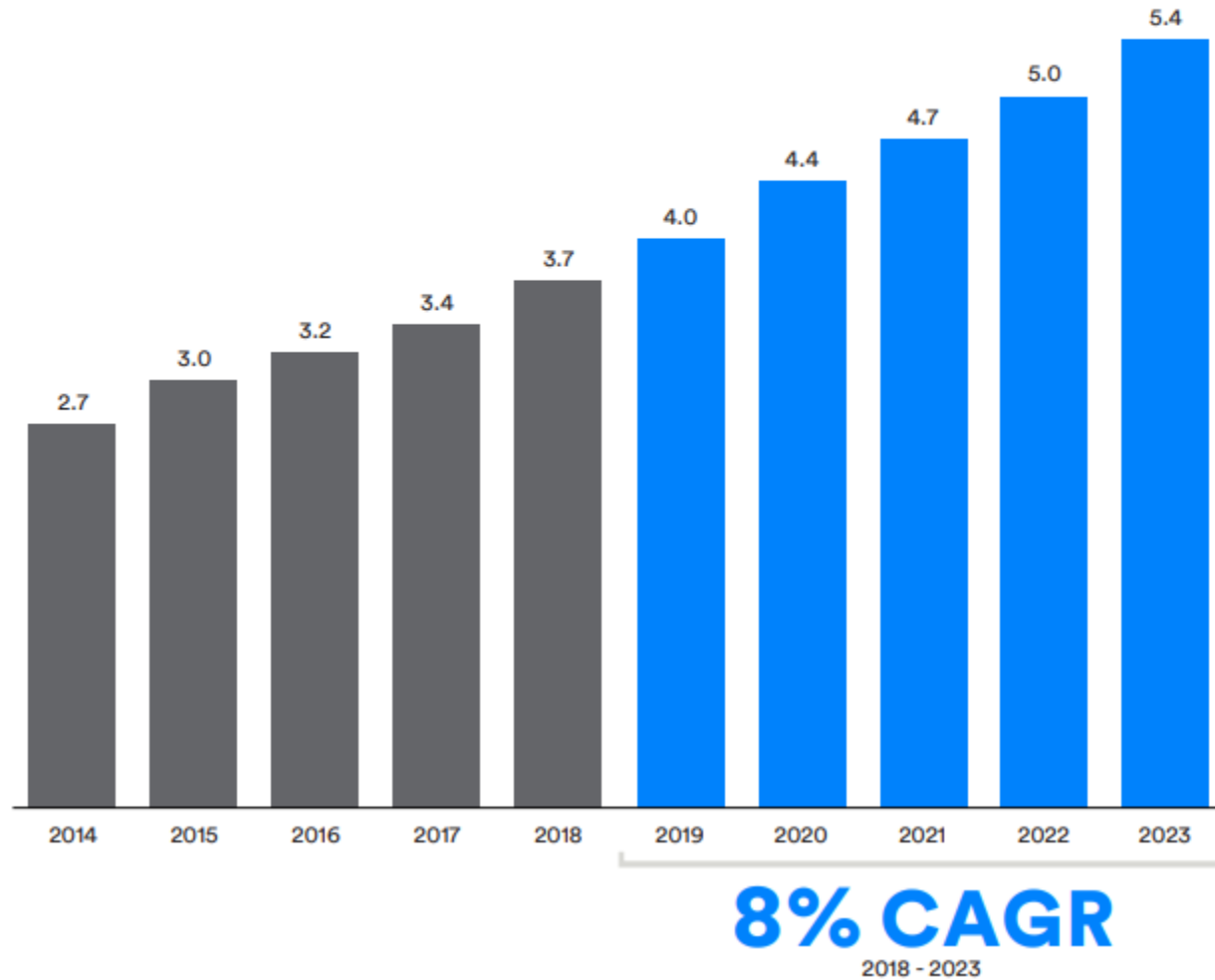
Il mercato Bluetooth nei prossimi 5 anni

(Fonte: Studio Frost & Sullivan)

- Il numero dei dispositivi Bluetooth installati passerà dai 45,6 Milioni di pezzi del 2002 ai 400 Milioni di pezzi del 2006.

Total Annual Bluetooth Device Shipments

numbers in billions



Source: ABI Research, 2019

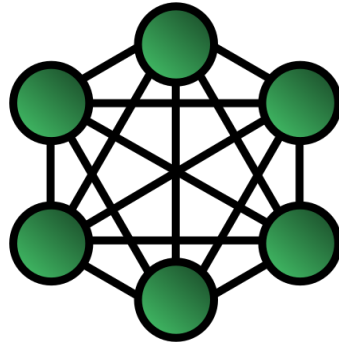
Capire la rete: Classificazione

Personal (PAN)
Local (LAN)
Storage (SAN)
Metropolitan (MAN)
Wide (WAN)
Internet

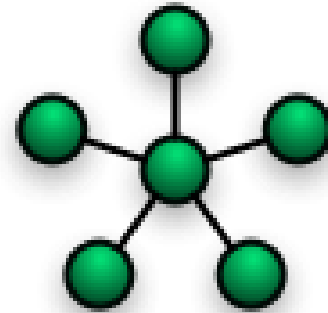
AN = Area Network

Capire la rete: le topologie

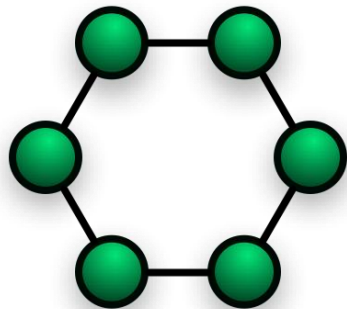
PUNTO-PUNTO



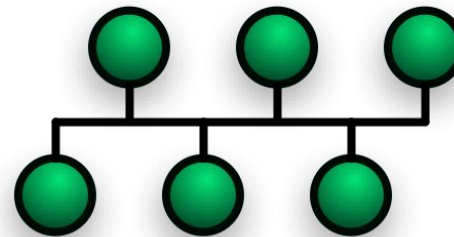
STELLA



ANELLO

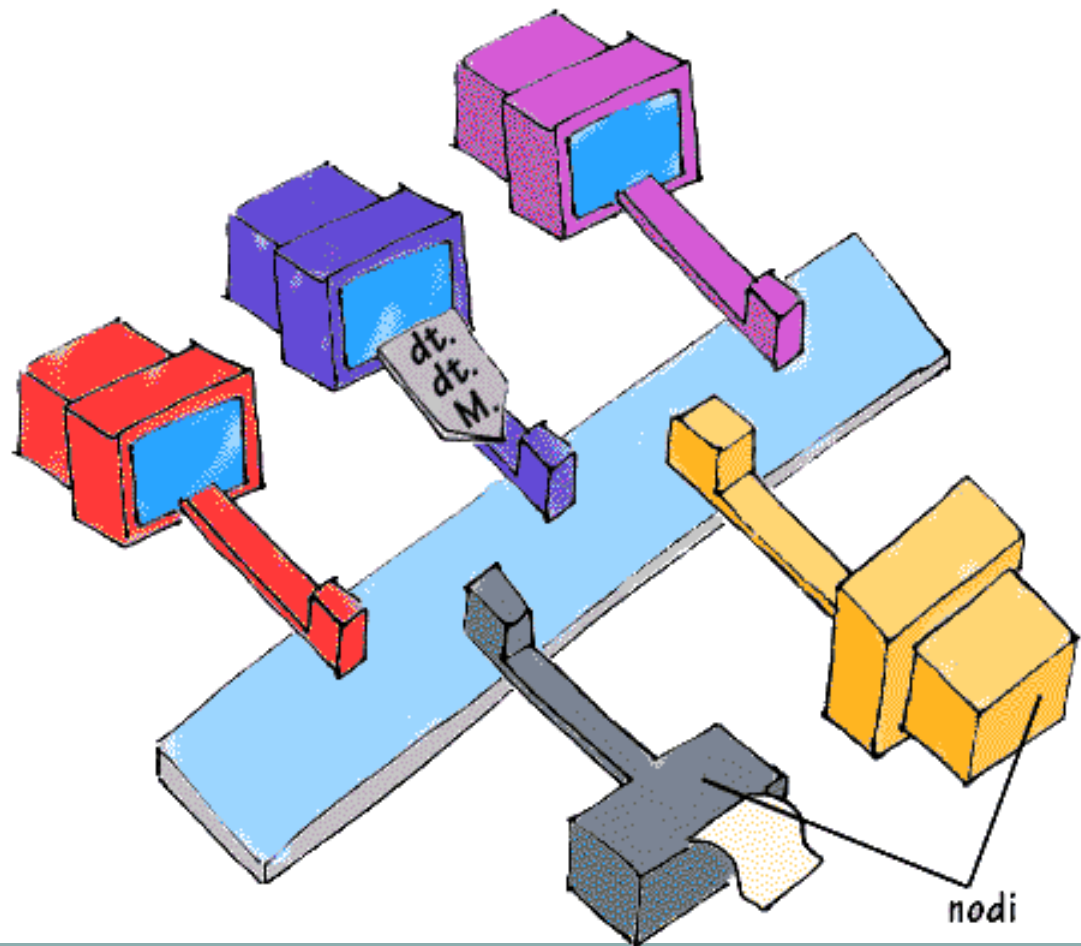


BUS



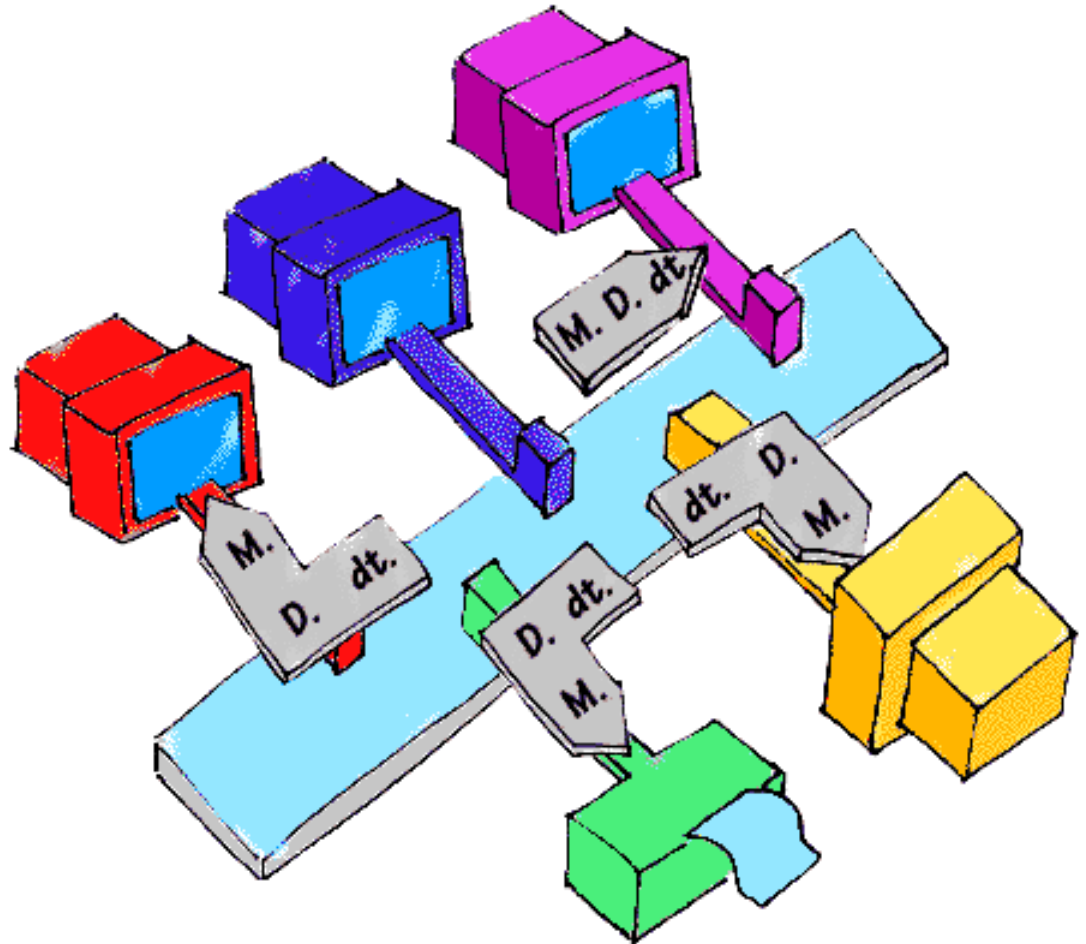
Capire la rete: L'infrastruttura

Le topologie di rete: Architettura a BUS



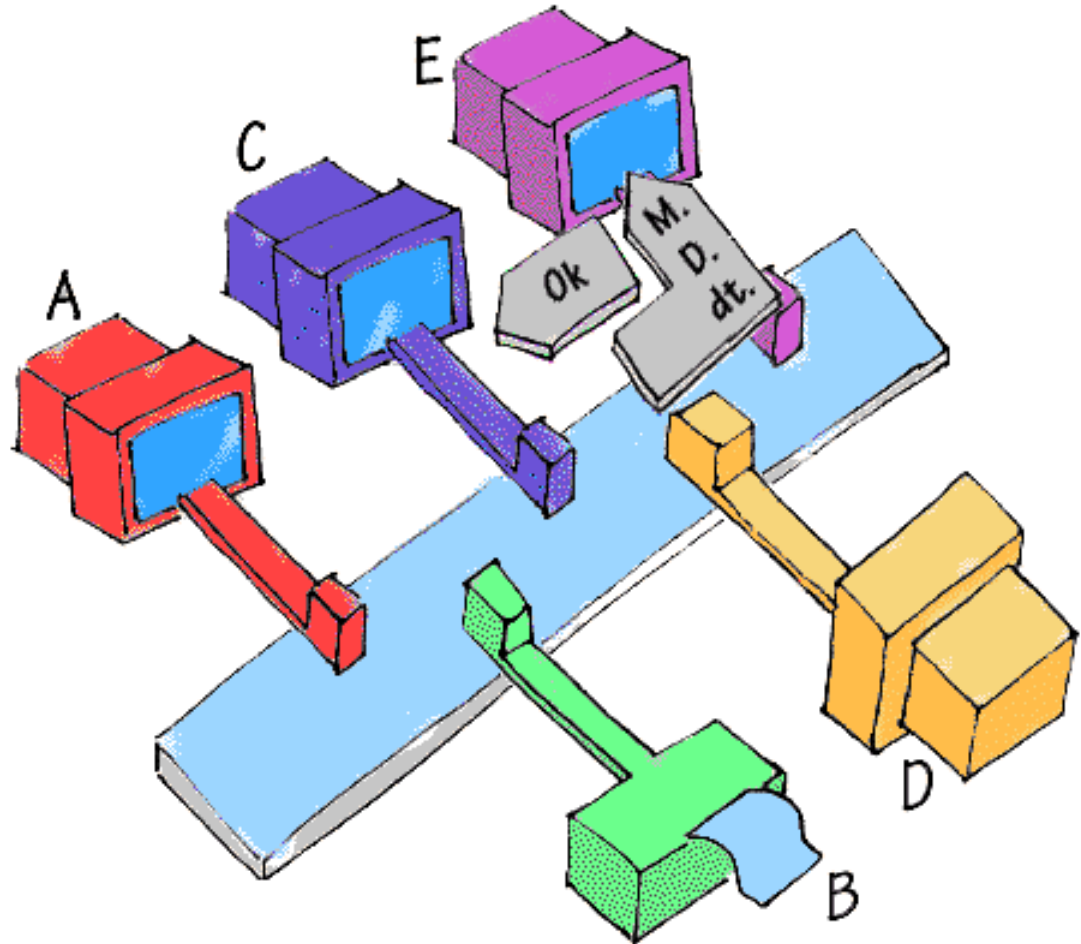
Capire la rete: L'infrastruttura

Le topologie di rete: Architettura a BUS



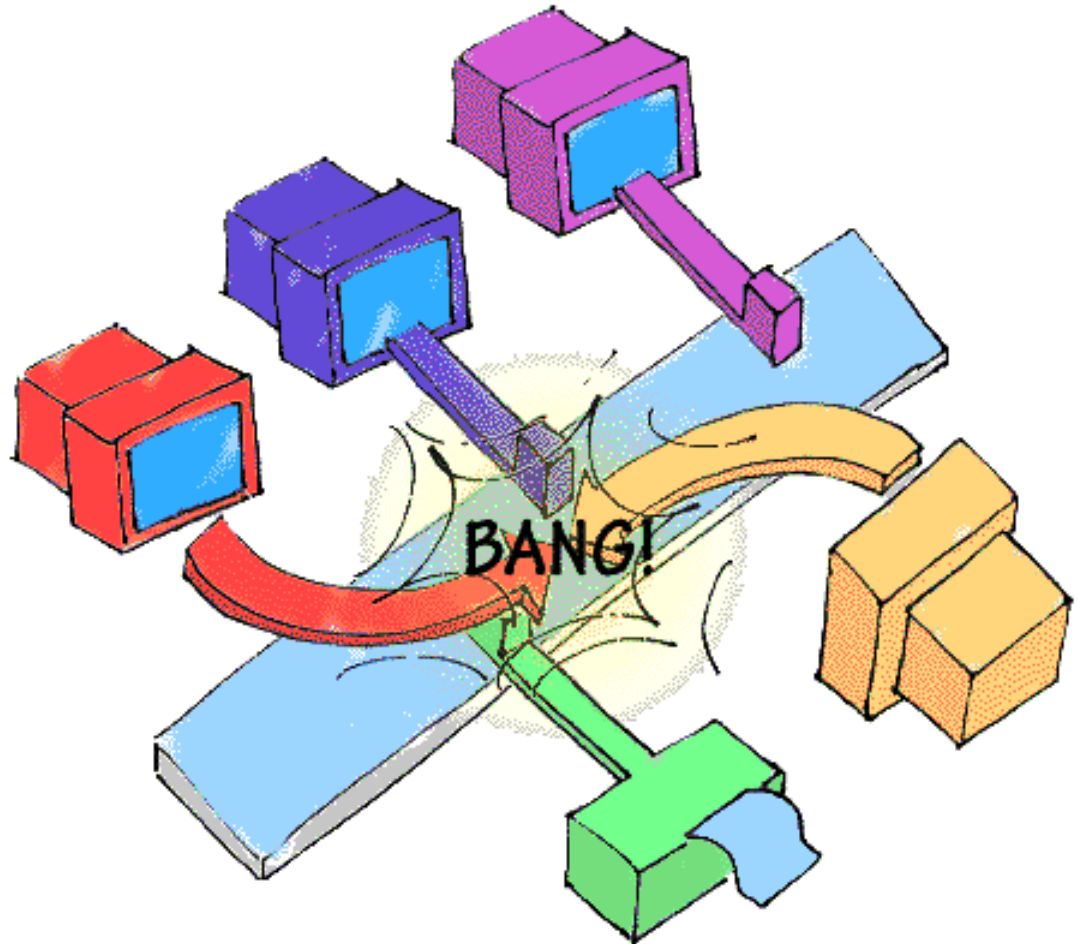
Capire la rete: L'infrastruttura

Le topologie di rete: Architettura a BUS



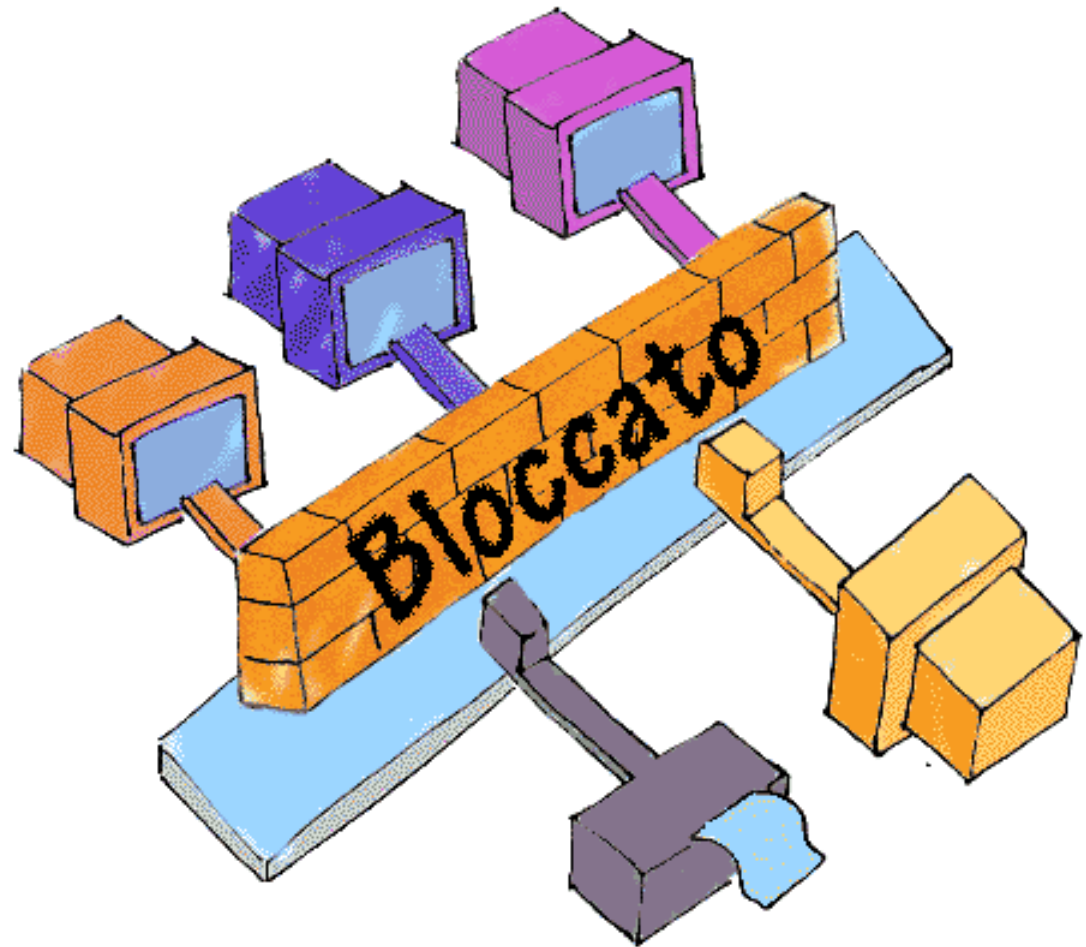
Capire la rete: L'infrastruttura

Le topologie di rete: Architettura a BUS



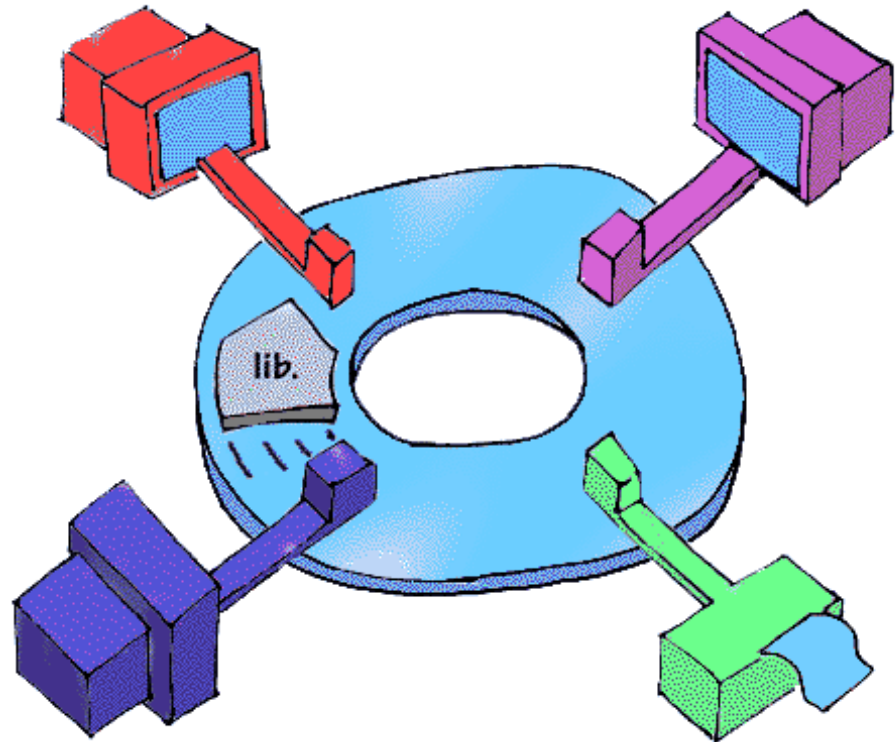
Capire la rete: L'infrastruttura

Le topologie di rete: Architettura a BUS



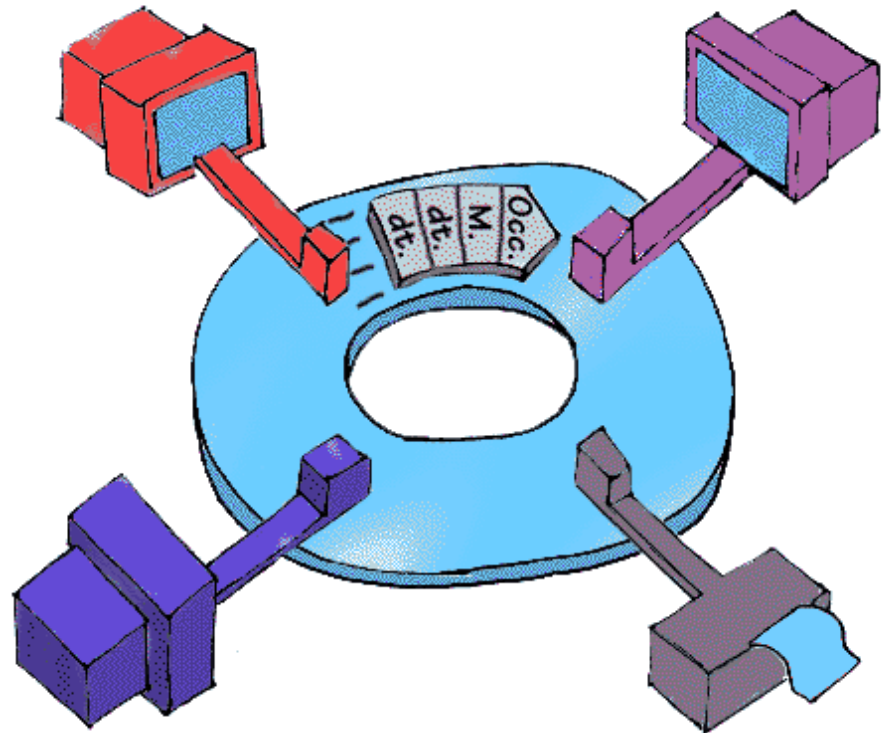
Capire la rete: **L'infrastruttura**

Le topologie di rete: Architettura ad anello



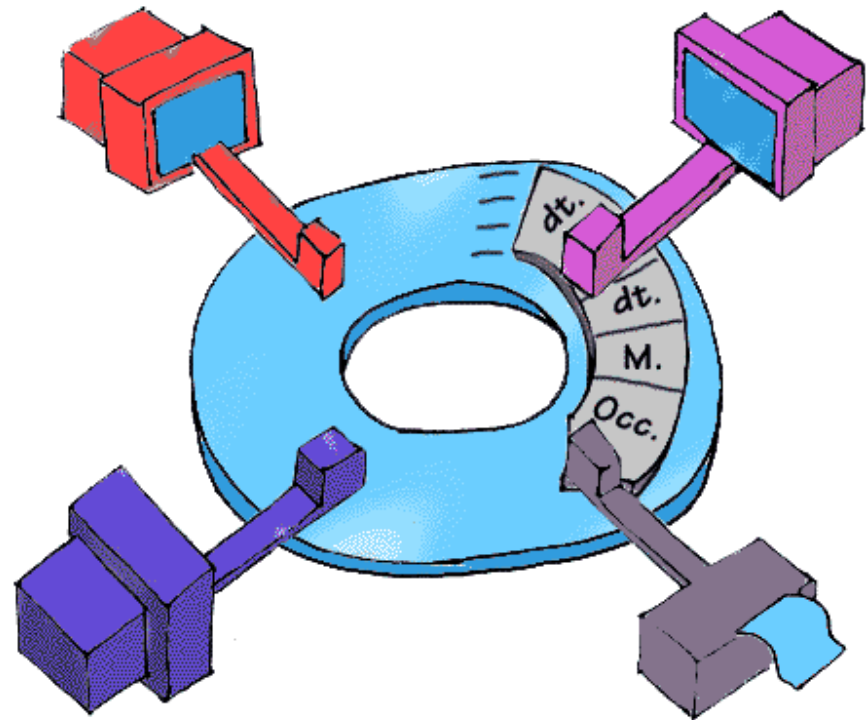
Capire la rete: L'infrastruttura

Le topologie di rete: Architettura ad anello



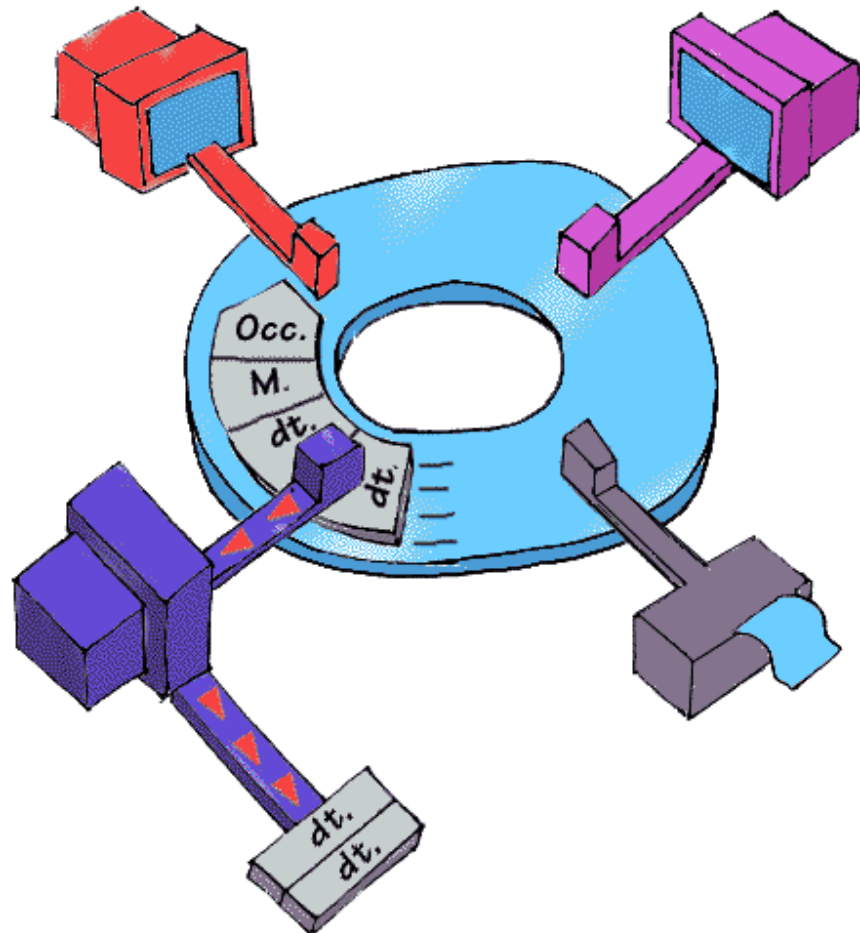
Capire la rete: L'infrastruttura

Le topologie di rete: Architettura ad anello



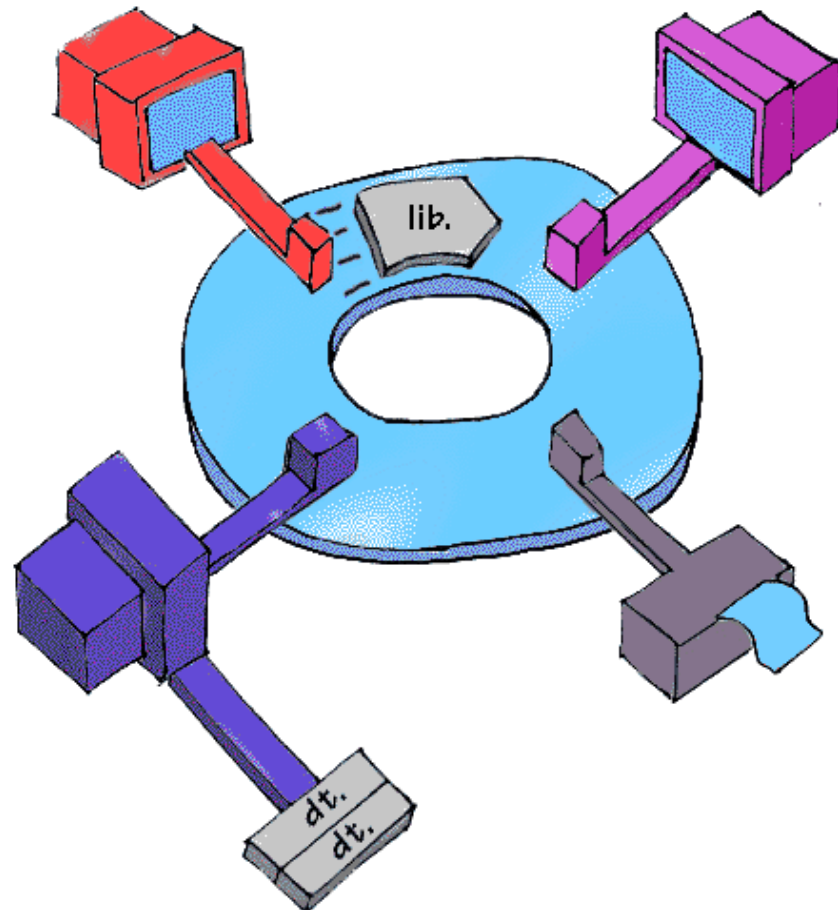
Capire la rete: L'infrastruttura

Le topologie di rete: Architettura ad anello



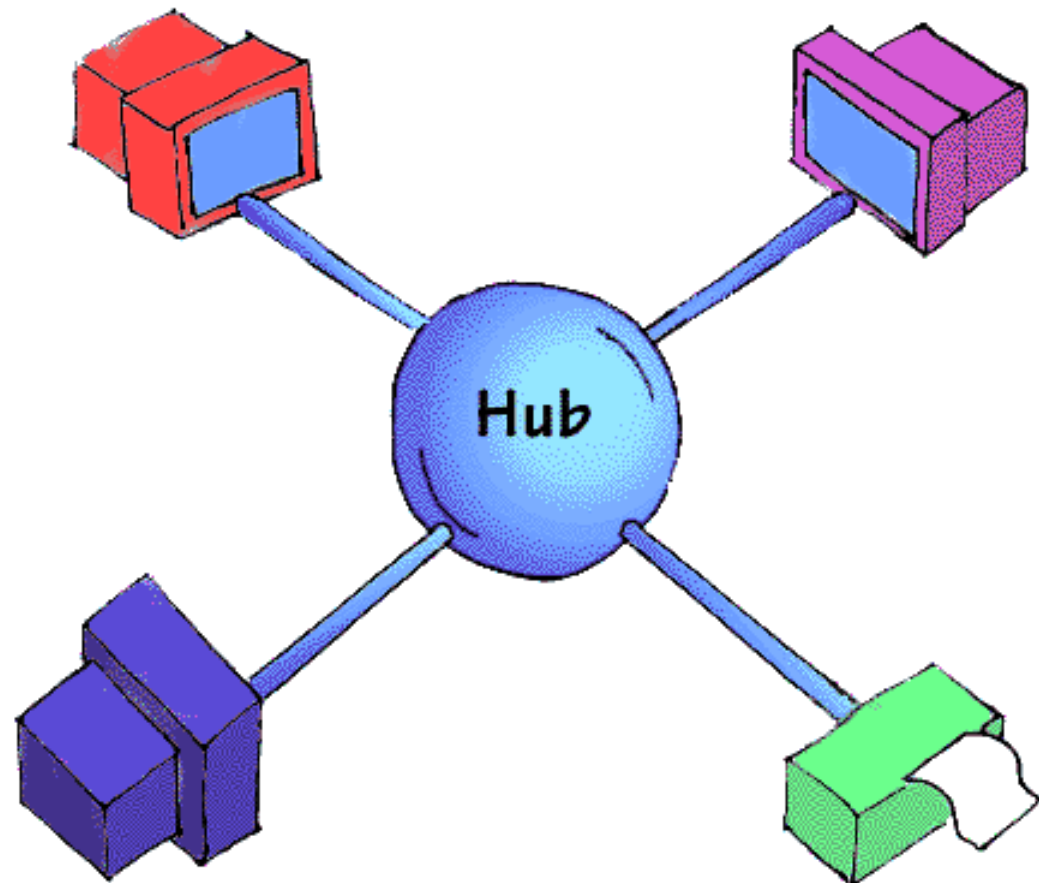
Capire la rete: **L'infrastruttura**

Le topologie di rete: Architettura ad anello



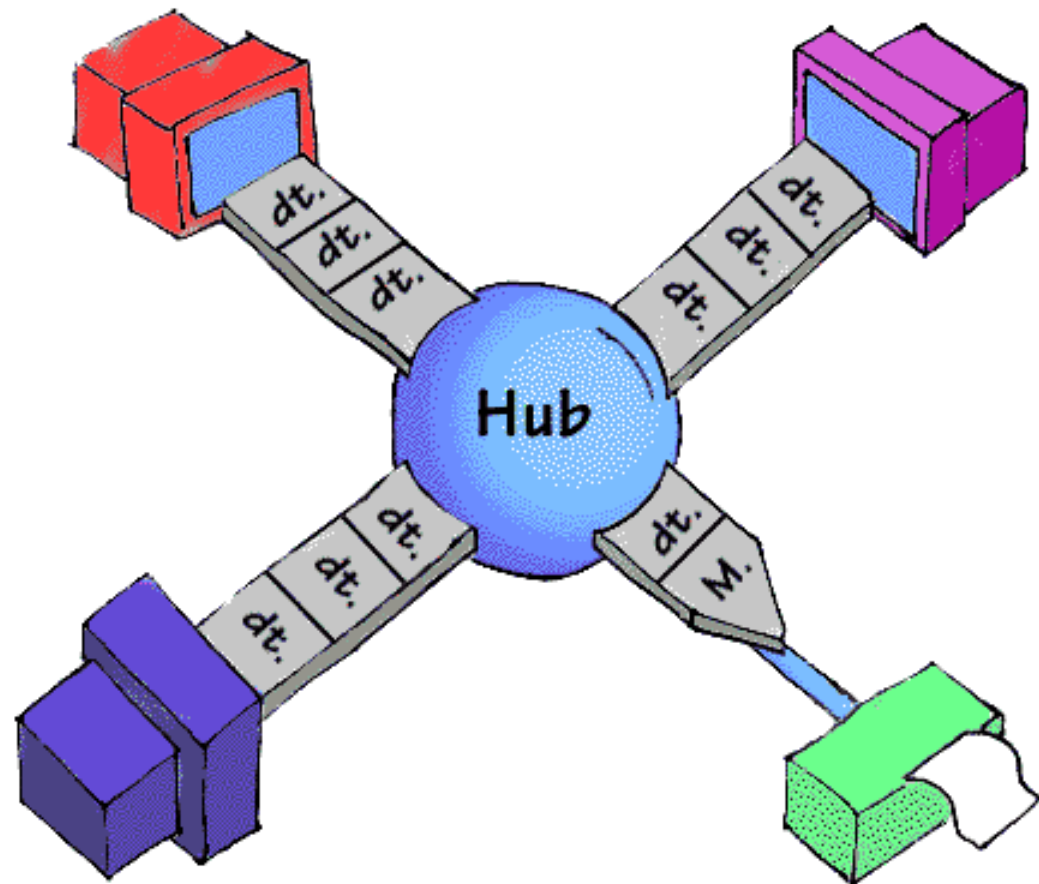
Capire la rete: L'infrastruttura

Le topologie di rete: Architettura a stella



Capire la rete: L'infrastruttura

Le topologie di rete: Architettura a stella



Capire la rete: **L'infrastruttura**

La LAN universalmente diffusa si chiama Ethernet



Capire la rete: L'infrastruttura

Per connettersi a una rete Ethernet serve una Scheda di rete (NIC)



Capire la rete: L'infrastruttura

NOTARE DIVERSI TIPI DI CONNETTORI ESTERNI



Capire la rete: **L'infrastruttura**

Ogni scheda Ethernet viene identificata da un indirizzo fisico:

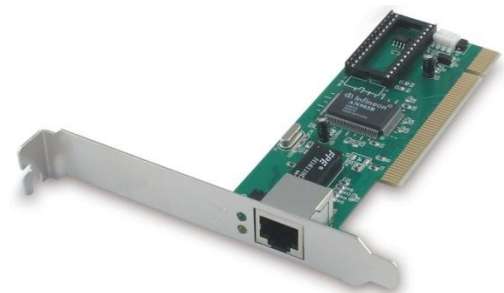
Il **MAC(Media Access Control) ADDRESS**

Example MAC Address

3A-34-52-C4-69-B8

Organizationally
Unique Identifier
(OUI)

Network Interface
Controller
(NIC)



Capire la rete: L'infrastruttura

Ogni scheda Ethernet viene identificata da un indirizzo fisico:

Il MAC(Media Access Control) ADDRESS



Capire la rete: **L'infrastruttura**

Ethernet usa una topologia a stella con cavi di tipo UTP e connettori RJ45



Capire la rete: L'infrastruttura

UTP = Unshielded Twisted Pair

Doppino non schermato



Capire la rete: L'infrastruttura

Apparati di rete

- HUB
- LOAD BALANCER
- ROUTER
- SWITCH
- FIREWALL

Capire la rete: **L'infrastruttura**

- Apparati di rete

- HUB

- SWITCH

A cosa servono?

- ROUTER

- FIREWALL

Capire la rete: **I protocolli di rete**

PROTOCOLLO DI COMUNICAZIONE

insieme di regole formalmente descritte che definiscono le modalità di comunicazione tra una o più entità

Capire la rete: **L'infrastruttura**

II TCP/IP

- Un protocollo di comunicazione:
- Il linguaggio della rete Internet

Capire la rete: **L'infrastruttura**

II TCP/IP

Richiede un indirizzo logico:

IP ADDRESS

Es. 193.76.100.12

Capire la rete: L'infrastruttura

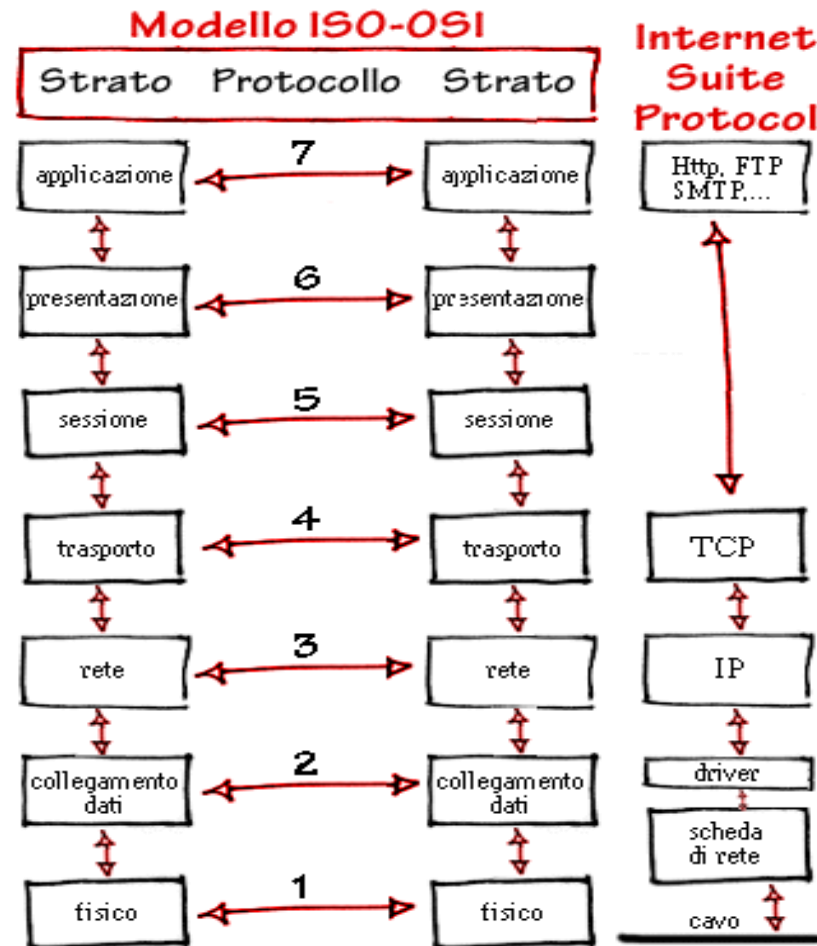
II TCP/IP

gli indirizzi per connettere un computer a INTERNET

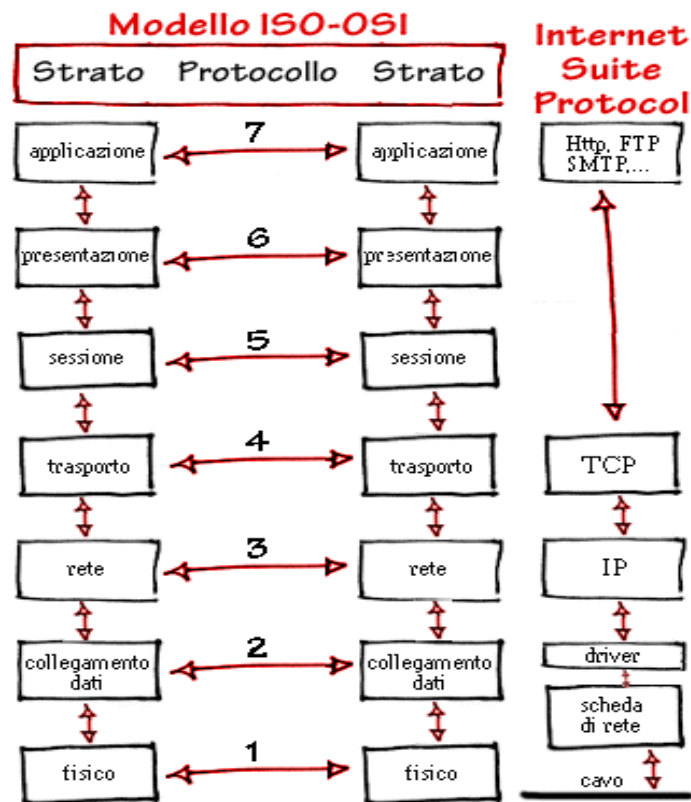
IP ADDRESS
SUBNET MASK
DEFAULT GATEWAY

DNS

Capire la rete: L'infrastruttura



Capire la rete: L'infrastruttura



LOAD BALANCER

FIREWALL

ROUTER

BRIDGE/SWITCH L2

HUB

Capire la rete: **Sicurezza**

Internet?

Intranet?

Extranet?

Capire la rete: **Sicurezza**

Internet

Rete mondiale basata su TCP/IP

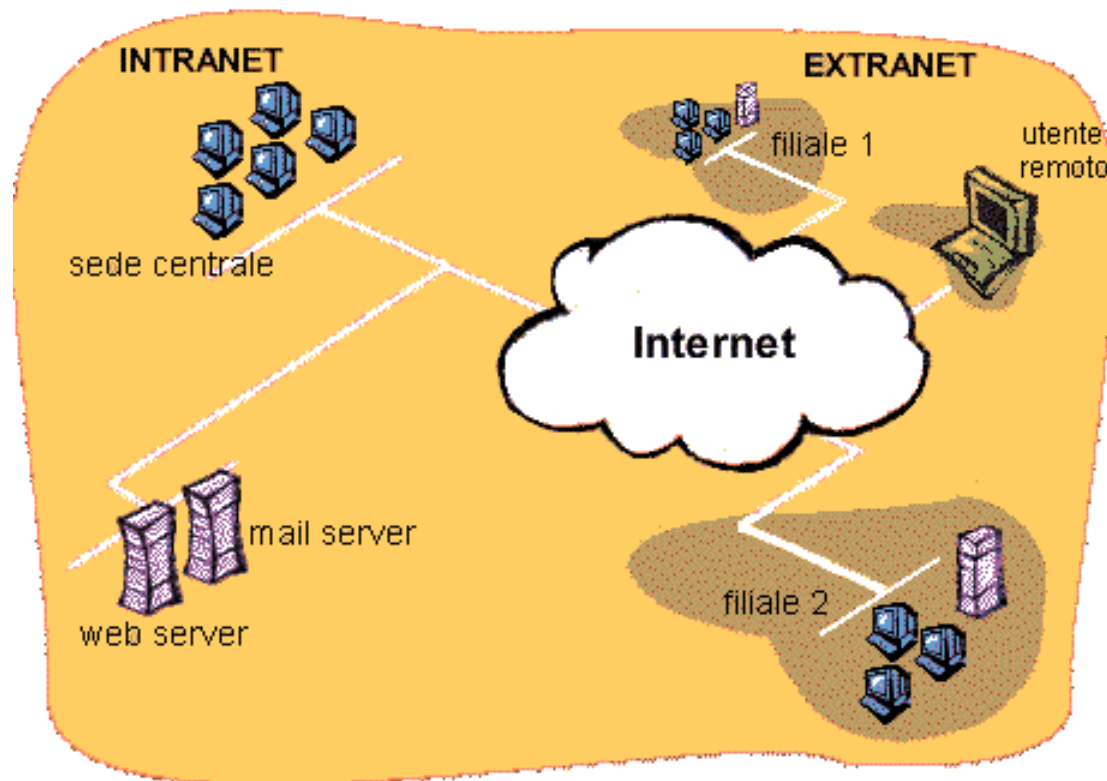
Intranet

Rete Locale basata su TCP/IP

Extranet

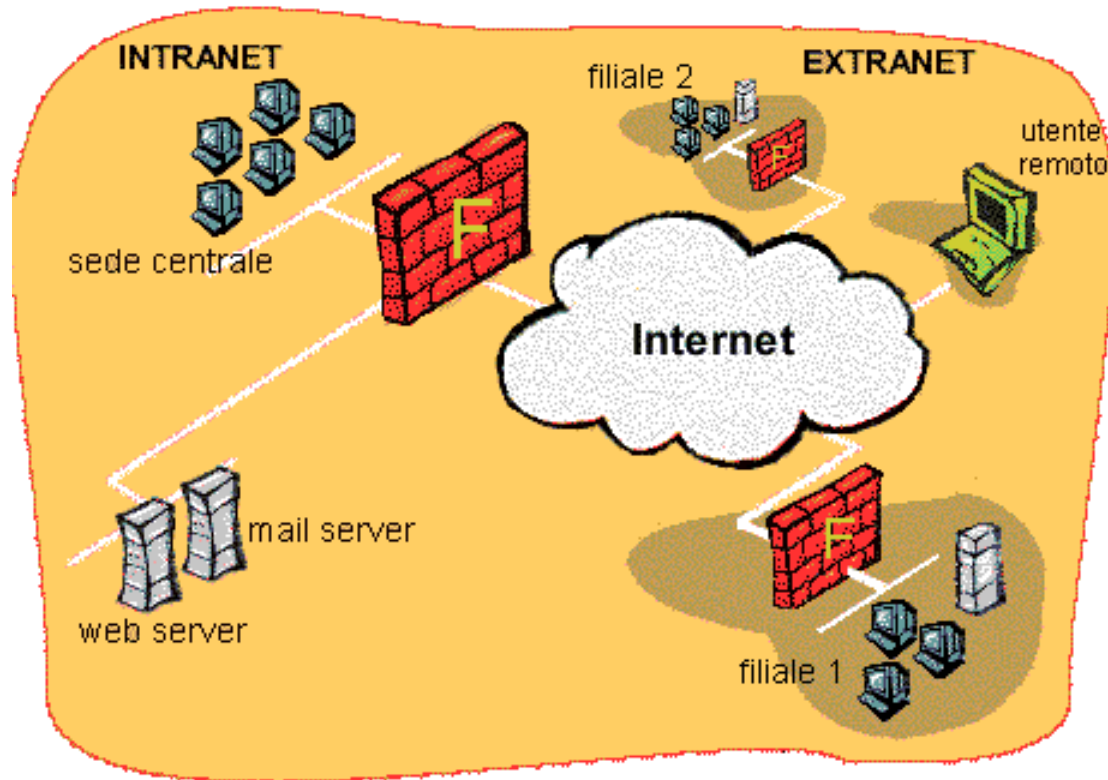
Rete locale basata su TCP/IP
in cui due o più sottoreti sono connesse via Internet

Capire la rete: **Sicurezza**



Capire la rete: **Sicurezza**

Il Firewall



Capire la rete: **Sicurezza**

Il Firewall

Chi offre servizi verso Internet

“DEVE”

dividere la propria rete in 2 zone

Capire la rete: **Sicurezza**

Il Firewall

- Una zona ad alta protezione
- Una zona a bassa protezione

La DMZ

Capire la rete: **Sicurezza**

Il Firewall

si pone tra:

•Internet

•La DMZ



•La rete aziendale interna

Nuova scheda x M Inbox (1,575) - twistmonk x Router x twistmonk

192.168.1.1/Status_Router.asp

elanco webinar Eli Lilly and Compan... aula01 webinar screencast fluentify router il fatto disostruzione mg admin mg pubb PRONTUARIO video... Altri Preferiti

Dual-Band Wireless-N Gigabit Router WRT320N

Status

Setup Wireless Security Access Restrictions Applications & Gaming Administration Status

Router | Local Network | Wireless Network


Router Information

Firmware Version:	v1.0.03 build 010 Jul 24, 2009
Firmware Verification:	b719582d5f3e57c1f7932a15d20ff509
Current Time:	Mon, 18 Jan 2016 13:49:29
Internet MAC Address:	68:7F:74:3B:54:F3
Host Name:	
Domain Name:	

[Help...](#)

Internet Connection

Connection Type:	PPPoE
Login Status:	Connected <input type="button" value="Disconnect"/>
Internet IP Address:	212.124.162.177
Subnet Mask:	255.255.255.255
Default Gateway:	81.174.0.21
DNS1:	88.149.128.22
DNS2:	88.149.128.12
DNS3:	
MTU:	1492



Nuova scheda x Inbox (1,575) - twistmonk x Basic Setup x twistmonk

192.168.1.1

elanco webinar Eli Lilly and Compan... aula01 webinar screencast fluentify router il fatto disostruzione mg admin mg pubb PRONTUARIO video... Altri Preferiti

Setup

- Setup
- Wireless
- Security
- Access Restrictions
- Applications & Gaming
- Administration
- Status

Basic Setup | DDNS | MAC Address Clone | Advanced Routing

Language

English

Internet Setup

Internet Connection Type

PPPoE

Username: W28737434998

Password: *****

Service Name (Optional):

☒ Connect on Demand: Max Idle Time 5 Minute.

☐ Keep Alive: Radial Period 30 Second.

Optional Settings
(required by some Internet Service Providers)

Host Name:

Domain Name:

MTU: Auto Size: 1492

Network Setup

Router IP

IP Address: 192 . 168 . 1 . 1

Subnet Mask: 255.255.255.0

DHCP Server Setting

DHCP Server: ☒ Enabled ☐ Disabled DHCP Reservation

Start IP Address: 192 . 168 . 1 . 100

Maximum Number of Users: 50

IP Address Range: 192 . 168 . 1 . 100 to 149

Client Lease Time: 0 minutes (0 means no limit)

[Help...](#)

LINKSYS® by Cisco

Firmware Version: v1.0.03

Wireless

Dual-Band Wireless-N Gigabit Router WRT320N

Setup Wireless Security Access Restrictions Applications & Gaming Administration Status

Basic Wireless Settings Wireless Security Wireless MAC Filter Advanced Wireless Settings

Basic Wireless Settings

Configuration View: ☒ Manual ☐ Wi-Fi Protected Setup

Wireless Band: ☒ 2.4 GHz ☐ 5 GHz

Network Mode: Disabled

Network Name (SSID): Mixed

Channel Width: Wireless-G Only

Channel: Wireless-B Only

SSID Broadcast: Disabled

Save Settings Cancel Changes

Help...

CISCO

Nuova scheda x Inbox (1,575) - twistmonk x Internet Access Policy x twistmonk

192.168.1.1/apply.cgi

elanco webinar Eli Lilly and Compan... aula01 webinar screencast fluentify router il fatto disostruzione mg admin mg pubb PRONTUARIO video... Altri Preferiti

Setup Wireless Security **Access Restrictions** Gaming Administration Status

Internet Access Policy

Access Policy: 2 () Delete This Entry Summary

Enter Policy Name:

Status: ☐ Enabled ☒ Disabled

(This Policy applies only to PCs on the List.)

☐ Deny Internet access during selected days and hours.

☒ Allow

Days: ☒ Everyday ☐ Sun ☐ Mon ☐ Tue ☐ Wed ☐ Thu ☐ Fri ☐ Sat

Times: ☒ 24 Hours : to :

Website Blocking by URL Address

URL 1: URL 3:
 URL 2: URL 4:

Website Blocking by Keyword

Keyword 1: Keyword 3:
 Keyword 2: Keyword 4:

Blocked Applications

Note: only three applications can be blocked per policy.

Applications		Blocked List
DNS (53 - 53)		
Ping (0 - 0)		
HTTPS (443 - 443)	>>	
FTP (21 - 21)	<<	
IMAP (143 - 143)		
SMTP (25 - 25)		
NNTP (119 - 119)		

[Help...](#)

List of PCs - Google Chrome

192.168.1.1/FilterIPMAC.asp

LINKSYS® by Cisco

List of PCs

MAC Address

01	00:00:00:00:00:00	06	00:00:00:00:00:00
02	00:00:00:00:00:00	07	00:00:00:00:00:00
03	00:00:00:00:00:00	08	00:00:00:00:00:00
04	00:00:00:00:00:00	09	00:00:00:00:00:00
05	00:00:00:00:00:00	10	00:00:00:00:00:00

IP Address

01	192 . 168 . 1 . 0	04	192 . 168 . 1 . 0
02	192 . 168 . 1 . 0	05	192 . 168 . 1 . 0
03	192 . 168 . 1 . 0	06	192 . 168 . 1 . 0

IP Address Range

01	192 . 168 . 1 . 0	to	0	03	192 . 168 . 1 . 0	to	0
02	192 . 168 . 1 . 0	to	0	04	192 . 168 . 1 . 0	to	0

[Save Settings](#) [Cancel Changes](#) [Close](#)

twistmonk

disostruzione mg admin + mg pubb PRONTUARIO video...

RestriCTIONS Caming Administration Status

Entry Summary

Help...

days and hours.

☐ Fri ☐ Sat

: 00 ▼

DNS (53 - 53)
Ping (0 - 0)
HTTPS (443 - 443)
FTP (21 - 21)
IMAP (143 - 143)
SMTP (25 - 25)
NNTP (119 - 119)

>>>
<<<

Nuova scheda x Inbox (1,575) - twistmonk x Management x twistmonk

192.168.1.1/Management.asp

elanco webinar Eli Lilly and Compan... aula01 webinar screencast fluentify router il fatto disostruzione mg admin mg pubb PRONTUARIO video... » Altri Preferit

Administration

Dual-Band Wireless-N Gigabit Router WRT320N

Setup Wireless Security Access Restrictions Applications & Gaming Administration Status

Management | Log | Diagnostics | Factory Defaults | Firmware Upgrade

Management

Router Password:

Re-enter to confirm:

Web Access

Web Utility Access: ☒ HTTP ☐ HTTPS

Web Utility Access via Wireless: ☒ Enabled ☐ Disabled

Remote Access

Remote Management: ☐ Enabled ☒ Disabled

Web Utility Access: ☐ HTTP ☐ HTTPS

Remote Upgrade: ☐ Enabled ☒ Disabled

Allowed Remote IP Address: ☐ Any IP Address

☐ to

Remote Management Port:

UPnP

UPnP: ☒ Enabled ☐ Disabled


Allow Users to Configure: ☒ Enabled ☐ Disabled

Allow Users to Disable Internet Access: ☐ Enabled ☒ Disabled

Backup and Restore

[Help...](#)

Save Settings **Cancel Changes**



- Login: screenshots
- Webmin

Backup Configuration Files

Change Language and Theme

Usermin Configuration

Webmin Actions Log

Webmin Configuration

Webmin Help

Webmin Servers Index

Webmin Users
- System

Servers

Networking

Hardware

Cluster


Others
- System Information

Logout


Module Config

Webmin Configuration


Webmin 1.340




IP Access Control




Ports and Addresses




Logging




Proxy Servers and Downloads




User Interface




Webmin Modules




Operating System and Environment




Language




Index Page Options




Upgrade Webmin




Authentication




Reassign Modules




Edit Categories




Module Titles




Webmin Themes




Trusted Referrers




Anonymous Module Access




File Locking




Mobile Device Options



Advanced Options



SSL Encryption



Certificate Authority

Start at boot time

☒ Yes ☐ No

Change this option to control whether Webmin is started at boot time or not. If it is not currently started at boot and Yes is chosen, a new init script will be created.

Restart Webmin

Click this button to re-start the Webmin server process. This may be necessary if you have recently upgraded Perl.

Login: screenshots

Webmin

System

Servers

Apache Webserver

BIND DNS Server

CVS Server

DHCP Server

Dovecot IMAP/POP3 Server

Fetchmail Mail Retrieval

Frox FTP Proxy

Jabber IM Server

Majordomo List Manager

Manage HTPasswd File

MySQL Database Server

OpenSLP Server

Postfix Configuration

PostgreSQL Database Server

ProFTPD Server

Proxmox Mail Filter

QMail Configuration

Read User Mail

SSH Server

Samba Windows File Sharing

Sendmail Configuration

Shared Folders

SpamAssassin Mail Filter

Squid Analysis Report

Generator

Squid Proxy Server

Help..

Module Config

Squid Proxy Server

Squid version 2.4

Apply Changes

Stop Squid

Search Docs..



Ports and Networking



Other Caches



Memory Usage



Logging



Cache Options



Helper Programs



Access Control



Administrative Options



Proxy Authentication



Authentication Programs



Delay Pools



Refresh Rules



Miscellaneous Options



Port Redirection Setup



Cache Manager Statistics



Clear and Rebuild Cache



Calamaris Log Analysis

Apply Configuration

Click this button to activate the current Squid configuration.

Stop Squid

Click this button to stop the running Squid proxy server. Once stopped, clients using it will be unable to make web or FTP requests.

Shorewall Firewall - Mozilla Firefox

File Edit View Go Bookmarks Tools Help








https://192.168.1.254:10000/shorewall/

Firefox Help Firefox Support Plug-in FAQ

[Webmin-Index](#) [Suche in der Hilfe](#)
[Modulkonfiguration](#)

Shorewall Firewall

Shorewall version 2.0.13

 Network Zones (zones)	 Network Interfaces (interfaces)	 Default Policies (policy)	 Firewall Rules (rules)
 Types of Service (tos)	 Masquerading (masq)	 Static NAT (nat)	 Proxy ARP (proxyarp)
 When Stopped (routestopped)	 VPN Tunnels (tunnels)	 Zone Hosts (hosts)	 Blacklist Hosts (blacklist)

Click this button to start Shorewall with the current configuration with the shorewall start command.

Click this button to have Shorewall validate your firewall configuration with the shorewall check command.

[← Zurück zu Startseite](#)

root logged into Webmin 1.160 on proxy (Debian GNU/Linux 3.0)

Iptables: comando per firewall in modalità testo

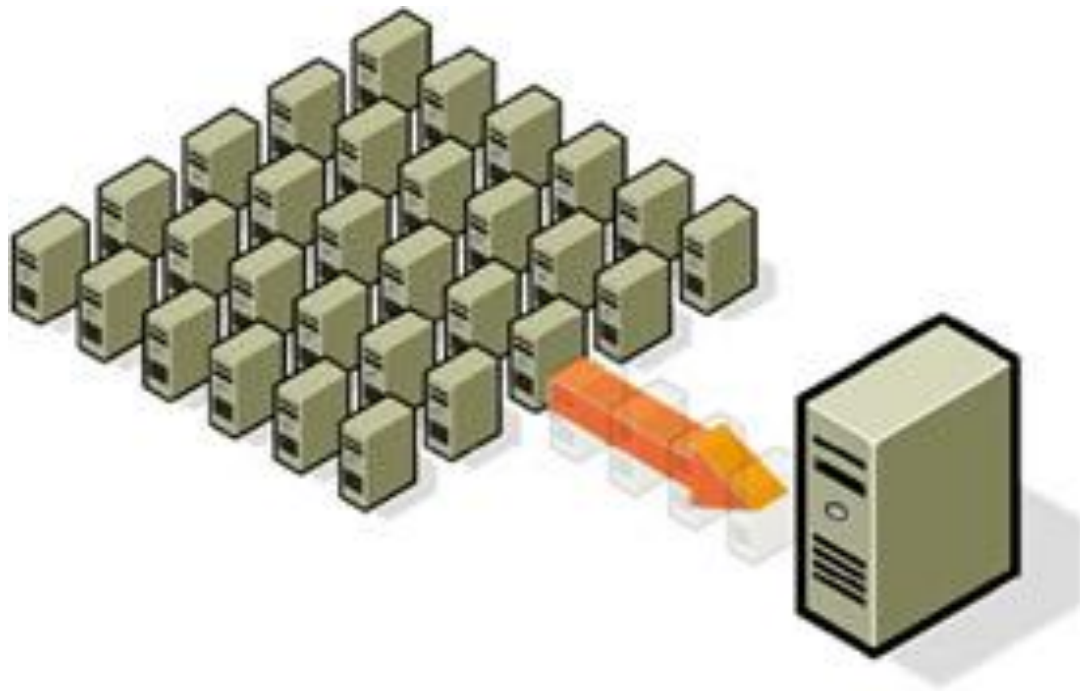
Capire la rete: **Rapporti con Internet Service Provider**

xDSL

- **D**igital **S**ubscriber **L**ine
 - utilizza l'esistente doppino telefonico (2 fili)
 - Duplex (bi-direzionale)
 - trasferisce bit (digitale vs. analogico)
 - il throughput è funzione della qualità e della distanza della tratta
- n ADSL (Asymmetric)
- n HDSL (High Data Rate) e SDSL (Single Pair / Symmetric)
- n IDSL (ISDN)
- n varie ed eventuali (VDSL-RADSL-UDSL-VoDSL-ecc.)

Cloud computing

Il fenomeno della virtualizzazione dei server

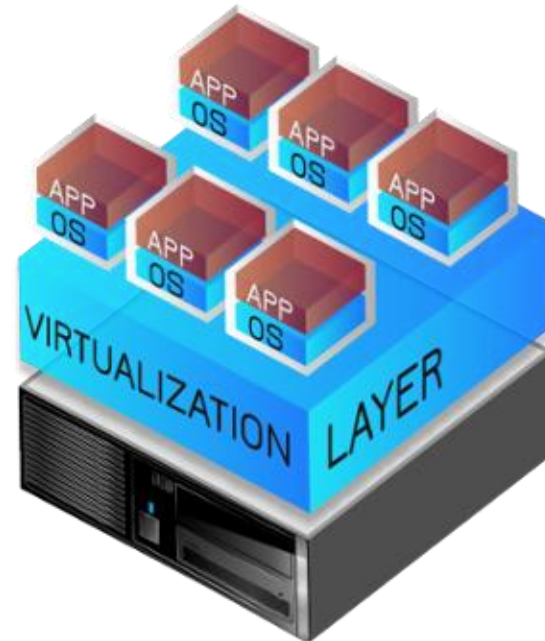


Cloud computing

Il fenomeno della virtualizzazione dei server



Traditional Server Architecture



Virtualized Server Architecture

Cloud computing

Il fenomeno della virtualizzazione dei server

