CCNA 1 - Introduction to Networks

1. Concetti di base sulle reti

- Definizione e scopi delle reti:
    - Le reti permettono la condivisione di risorse e la comunicazione tra dispositivi, ciò include file, applicazioni, server e dispositivi hardware come stampanti.
    - La loro struttura influisce su velocità, sicurezza e scalabilità.
- Tipi di rete:
    - **WLAN**: rete wirelss.
    - **LAN**: rete locale.
    - **MAN**: rete dislocata a livello metropoli.
    - **WAN**: rete dislocata su vasta area geografica.
- Le reti includono:
    - **Dispositivi finali**:
        - Client/PC
        - Server
        - Smartphone/Laptop
    - **Dispositivi di rete**:
        - Router: collegano diverse reti e instradano i pacchetti dati.
        - Switch: gestiscono la comunicazione all'interno di una LAN.
        - Access Point: estendono la connettività a dispositivi wireless.
        - Host/Client: dispositivo che richiede un servizio/dati
        - Server: dispositivo che fornisce un servizio/dati
    - **Mezzi di trasmissione**:
        - Cavi UTP: Economici e usati nelle LAN.
        - Cavi in rame, fibra ottica, onde radio.

2. Modello OSI e TCP/IP

- **Modello OSI** (Open Systems Interconnection):
    - Composto da 7 livelli, è una guida per la progettazione di reti.
    - Ogni livello ha una funzione specifica:
        - Il livello trasporto assicura il trasferimento affidabile dei dati, mentre il livello rete si occupa dell'instradamento.
- **Modello TCP/IP**:
    - Più pratico e basato su standard internet.
    - Si divide in 4 livelli:
        - Accesso alla rete (*Physical*, *Data-Link*)
        - Internet (*Network*)
        - Trasporto (*Transport*)
        - Applicazione (*Session*, *Presentation*, *Application*)
    - **Protocolli principali** per ogni livello:
        - *Livello 1*: **Ethernet**, **Wi-Fi**.
        - *Livello 2*: **ARP**, **VLAN**.
        - *Livello 3*: **IP**, **ICMP**.
        - *Livello 4*: **TCP**, **UDP**.
        - *Livello 7*: **HTTP**, **FTP**, **DNS**.
- Differenze principali:
    - **OSI** è teorico e strutturato.
    - **TCP/IP** è pratico e utilizzato per Internet
- Utilità: Forniscono standard per progettare e implementare reti.

3. Indirizzamento IP

- Assegnazione di identificativi univoci ai dispositivi in rete per permettere la comunicazione tra dispositivi.

- Gli **indirizzi IP** identificano i dispositivi in rete:

    - **IPv4**:
        - Formato a 32 bit (es. 192.168.1.1).
        - *Privato* (Classe A, B, C) e *Pubblico*.
        - Limitato nel numero di indirizzi disponibili.
    - **IPv6**:
        - Formato a 128 bit, creato per superare la scarsità di IPv4.

- **Subnetting**:

    - Consente di suddividere una rete in sottoreti, migliorando la gestione degli indirizzi IP e la sicurezza.
    - **Protocolli**: CIDR (Classless Inter-Domain Routing)

- **Protocolli**: IPv4, IPv6, DHCP

4. Routing e Switching

- **Routing**:
  - Processo di inoltro dei pacchetti tra reti diverse.
  - Utilizza protocolli come OSPF, RIP e EIGRP.
  - Il routing è essenziale per la connettività WAN.
- **Switching**:
  - Smista i dati all'interno di una rete locale (LAN) utilizzando indirizzi MAC.
  - Lo switching migliora le prestazioni delle LAN, riducendo le collisioni.

5. Protocolli di rete

- **Protocolli fondamentali**:
  - **TCP**
  - **UDP**
  - **ICMP**
  - **ARP**
  - **DNS**
  - **DHCP**
- Differenze tra TCP (affidabile, classfull, 3-hand-shake) e UDP (veloce, classless, best-effort).
- Funzionamento di **DNS** e **DHCP**.

6. Configurazione di base di dispositivi di rete

- Introduzione alla *CLI* di Cisco.
- Configurazione iniziale di router e switch.
- Comandi (*vedi allegato*).

CCNA2 (Switching, Routing, and Wireless Essentials)

1. Concetti di switching

- Funzionamento degli switch e tabelle MAC.
- **VLAN**:
    - Creazione di reti virtuali separate su uno switch fisico.
    - Migliorano la sicurezza e le performance della rete, separando logicamente il traffico all'interno di una LAN.
- **Trunking**: 802.1Q e protocollo **DTP**.

2. Routing e protocolli di routing

- Tipologie di **routing**:
    - **Statico**
    - **Dinamico** (automatizzano la scelta del percorso ottimale):
        - **RIP**
        - **OSPF** (Open Shortest Path First)
        - **EIGRP** (Enhanced Interior Gateway Routing Protocol)
- Tabelle di routing e processo di inoltro.

3. Sicurezza di rete

- Sicurezza di base su switch e router: configurazione di password e **SSH**.
- Implementare misure come:
    - **ACL** (Access Control Lists):
        - Limitano il traffico non autorizzato.
    - **Port Security**:
        - Impedisce l'accesso ai dispositivi non autorizzati su una porta switch.
    - **VPN**:
        - Protegge i dati trasmessi su reti pubbliche (**IPsec**).

4. Configurazione di NAT e PAT

- Il protocollo **NAT** viene usato per permettere alle reti private di accedere a Internet:
    - NAT mappa indirizzi **IPv4 privati** su **IPv4 pubblici** (e vice versa)
        - **NAT statico**
        - **NAT dinamico**
    - **PAT** permette a più dispositivi di condividere un unico IP pubblico.
    - **NAT6**4 mappa **indirizzi IPv6** su **indirizzi IPv4** (e vice versa)
    - Vantaggi: sicurezza, Preservare indirizzi IPv4 pubblici, schema IP
    - Svantaggi: no End-to-End, delay (video/voce, TCP), VPN (IPsec)

TEMPLATE ROUTER

```
Router> enable
Router# configure terminal
Router(config)# hostname "R1"
R1(config)# enable secret "cisco"
R1(config)# service password-encryption
R1(config)# login block-for 30 attempts 2 within 10
R1(config)# banner motd # "ACCESSO RISERVATO ROUTER" #
R1(config)# ipv6 unicast-routing
// CONFIGURAZIONE ACCESSO CAVO CONSOLE
R1(config)# line console 0
R1(config-if)# logging synchronous
R1(config-if)# password "cisco"
R1(config-if)# login local
R1(config-if)# exec-timeout 6 0
R1(config-if)# exit
// CONFIGURAZIONE ACCESSO REMOTO SSH
R1(config)# ip domain-name "cisco.com"
R1(config)# ip ssh version 2
R1(config)# crypto key generate rsa general-keys modulus 1024
R1(config)# username "ADMIN" privilege 15 secret "cisco"
// CONFIGURAZIONE LINEE VIRTUALI
R1(config)# line vty 0 15
R1(config-if)# login local
R1(config-if)# password "cisco"
R1(config-if)# transport input [ssh | telnet]
R1(config-if)# exec-timeout 6 0
R1(config-if)# exit
// CONFIGURAZIONE INTERFACCIA FISICA
R1(config)# interface [gigabitethernet | serial] 0/1
R1(config-if)# description "LINK TO NETWORK 192.168.50.0/24"
R1(config-if)# ip address "192.168.50.1" "255.255.255.0"
R1(config-if)# ipv6 address "2001:db8:acad:50::1/64"
R1(config-if)# ipv6 address "fe80::50:1" link-local
R1(config-if)# no shutdown
R1(config-if)# exit
// CONFIGURAZIONE INTERFACCIA VIRTUALE VLAN
R1(config)# interface [gigabitethernet | serial] 0/0
R1(config-if)# no shutdown
R1(config-if)# exit
R1(config)# interface [gigabitethernet | serial] 0/0.10
R1(config-if)# description "DEFAULT-GATEWAY TO LAN 10"
R1(config-if)# encapsulation dot1Q 10
R1(config-if)# ip address "192.168.10.1" "255.255.255.0"
R1(config-if)# ipv6 address "2001:db8:acad:10::1/64"
R1(config-if)# ipv6 address "fe80::10:1" link-local
R1(config-if)# no shutdown
```

```
R1(config-if)# exit
// CONFIGURAZIONE INTERFACCIA VIRTUALE MANAGEMENT VLAN
R1(config)# interface [gigabitethernet | serial] 0/0.99
R1(config-if)# description "DEFAULT-GATEWAY TO MANAGEMENT"
R1(config-if)# encapsulation dot1Q 99
R1(config-if)# ip address "192.168.99.1" "255.255.255.0"
R1(config-if)# ipv6 address "2001:db8:acad:99::1/64"
R1(config-if)# ipv6 address "fe80::99:1" link-local
R1(config-if)# no shutdown
R1(config-if)# exit
// CONFIGURAZIONE INTERFACCIA VIRTUALE NATIVE VLAN
R1(config)# interface [gigabitethernet | serial] 0/0.88
R1(config-if)# description "NATIVE VLAN"
R1(config-if)# encapsulation dot1Q 88 native
R1(config-if)# no shutdown
R1(config-if)# exit
// CONFIGURAZIONE ROTTE STATICHE
R1(config)# ip route "192.168.20.0" "255.255.255.128" "10.10.10.1" [interface] [distance]
R1(config)# ipv6 route" 2001:db8:acad:2::/64" "10.10.10.1" [interface] [distance]
// CONFIGURAZIONE ROTTE DEFAULT
R1(config)# ip route "0.0.0.0" "0.0.0.0" "10.10.20.1" [interface] [distance]
R1(config)# ipv6 route "::/0" "10.10.10.1" [interface] [distance]
// CONFIGURAZIONE ROTTE BACK-UP
R1(config)# ip route "192.168.20.0" "255.255.255.128" "20.20.20.1" [interface] 10
R1(config)# ipv6 route "2001:db8:acad:2::/64" "20.20.20.1" [interface] 12
// CONFIGURAZIONE DHCP VLAN
R1(config)# ip dhcp excluded-address "192.168.10.1" "192.168.10.10"
R1(config)# ip dhcp excluded-address "192.168.10.253", "192.168.10.254"
R1(config)# ip dhcp pool VLAN-10
R1(dhcp-config)# network "192.168.10.0" "255.255.255.0"
R1(dhcp-config)# default-router "192.168.10.1"
R1(dhcp-config)# domain-name "cisco.com"
R1(dhcp-config)# dns-server "192.168.10.2"
R1(dhcp-config)# exit
// CONFIGURAZIONE ROTTE PER DHCP
R1(config)# ip route "192.168.10.0" "255.255.255.0" "10.10.10.2"
R1(config)# ipv6 route "192.168.20.0" "255.255.255.0" "10.10.10.2"
// CONFIGURAZIONE DHCP LINK POINT TO POINT
R1(config)# ip dhcp excluded-address "10.10.10.1"
R1(config)# ip dhcp pool "R1-R2"
R1(dhcp-config)# network "10.10.10.0" "255.255.255.252"
R1(dhcp-config)# domain-name "cisco.com"
R1(dhcp-config)# exit
// SE ABILITO DHCP SNOOPING SU SWITCH
R1(config)# ip dhcp relay information trus-all
// CONFIGURAZIONE DHCP STATEFUL VLAN
R1(config)# ipv6 dhcp pool "STATEFULL-10"
```

```
R1(config-dhcpv6)# address prefix "2001:db8:acad:10::/64"
R1(config-dhcpv6)# domain-name "cisco.com"
R1(config-dhcpv6)# dns-server "2001:db8:acad:10::1"
R1(config-dhcpv6)# exit
// CONFIGURO VLAN DCHP STATEFULL
R1(config)# interface gigabitethernet 0/1.10
R1(config-if)# description "DEFAULT-GATEWAY to UFFICIO"
R1(config-if)# encapsulation dot1Q 10
R1(config-if)# ipv6 address "2001:db8:acad:10::1/64 "
R1(config-if)# ipv6 address "fe80::10:1"
R1(config-if)# ipv6 nd managed-config-flag
R1(config-if)# ipv6 nd prefix default no-autoconfig
R1(config-if)# ipv6 dhcp server "STATEFULL-10"
R1(config-if)# exit
// CONFIGURAZIONE OSPF
R1(config)# router opsf 10
R1(config-router)# router-id 1.1.1.1
R1(config-router)# network 192.168.10.0 0.0.0.255 area 0
R1(config-router)# network 10.10.200.0 0.0.0.255 area 0
R1(config-router)# passive-interface g0/0
R1(config-router)# passive-interface g0/0.20
R1(config-router)# ip ospf hello-interval 20
R1(config-router)# ip ospf dead-interval 80
R1(config-router)# ip ospf priority 10
R1(config-router)# ip ospf cost 100
R1(config-router)# auto-cost reference-bandwidth 1000
R1(config-router)# default-information originate
R1(config-router)# exit
R1(config)# interface gigabitethernet 1/1
R1(config-if)# ip helper-address 10.10.10.1
R1(config-if)# exit
R1(config)# interface serial 0/1/1
R1(config-if)# ip ospf 10 area 0
R1(config-if)# exit
R1(config)# interface serial 0/1/2
R1(config-if)# ip ospf network point-to-point
R1(config-if)# exit
// CONFIGURAZIONE ACL
R1(config)# access-list 10 deny 192.168.30.0 0.0.0.255
R1(config)# access-list 10 permit any
R1(config)# ip access-list extended NAMED_ACL
R1(config-ext-nacl)# remark "BLOCCO TELNET"
R1(config-ext-nacl)# deny tcp any 192.168.93.0 0.0.0.255 eq 23
R1(config-ext-nacl)# 17 deny tcp any 192.168.103.0 0.0.0.255 eq 23
R1(config-ext-nacl)# permit ip any any
R1(config-ext-nacl)# exit
R1(config)# interface gigabitethernet 1/1
```

```
R1(config-if)# ip access-group 10 in
R1(config-if)# ip access-group NAMED_ACL out
R1(config-if)# exit
// CONFIGURAZIONE NAT STATICO
R1(config)# ip nat inside source static 192.168.10.10 169.170.10.2
R1(config)# interface serial 0/0/1
R1(config-if)# ip address 192.168.1.2 255.255.255.0
R1(config-if)# ip nat inside
R1(config-if)# exit
R1(config)# interface serial 1/0/0
R1(config-if)# ip address 169.170.10.1 255.255.255.0
R1(config-if)# ip nat outside
R1(config-if)# exit
// CONFIGURAZIONE NAT DINAMICO
R1(config)# ip nat pool NAT_POOL1 169.170.10.2 169.170.10.12 netmask 255.255.255.224
// CONFIGURAZIONE NAT OVERLOAD (PAT)
R1(config)# ip nat pool PAT_POOL2 169.170.10.2 169.170.10.12 netmask 255.255.255.224 overload
// NAT DINAMICO e PAT
R1(config)# ip access-list 1 permit 192.168.0.0 0.0.0.255
R1(config)# ip access-list standard ACL_POOL1 permit
R1(config-if)# permit 192.168.0.0 0.0.0.255
R1(config-if)# exit
R1(config)# ip nat inside source list 1/ACL_POOL1 pool NAT_POOL/PAT_POOL2
R1(config)# interface serial 1/1/0
R1(config-if)# ip nat inside
R1(config-if)# exit
R1(config)# interface serial 1/1/1
R1(config-if)# ip nat outside
R1(config-if)# exit
// CONFIGURO INTERFACCIA LOOPBACK
R1(config)# interface loopback 1
R1(config-if)# ip address 1.1.1.1 255.255.255.255
R1(config-if)# exit
R1(config)# end
```

TEMPLATE SWITCH

```
Switch> enable
Switch# configure terminal
Switch(config)# hostname "S1"
S1(config)# enable secret "cisco"
S1(config)# service password-encryption
S1(config)# login block-for 30 attempts 2 within 10
S1(config)# banner motd # "ACCESSO RISERVATO SWITCH" #
S1(config)# ip default-gateway "192.168.99.1"
// CONFIGURAZIONE ACCESSO CAVO CONSOLE
S1(config)# line console 0
S1(config-if)# logging synchronous
S1(config-if)# password "cisco"
S1(config-if)# login local
S1(config-if)# exec-timeout 6 0
S1(config-if)# exit
// CONFIGURAZIONE ACCESSO REMOTO SSH
S1(config)# ip domain-name "cisco.com"
S1(config)# ip ssh version 2
S1(config)# crypto key generate rsa general-keys modulus 1024
S1(config)# username "ADMIN" privilege 15 secret "cisco"
// CONFIGURAZIONE LINEE VIRTUALI
S1(config)# line vty 0 15
S1(config-if)# login local
S1(config-if)# password "cisco"
S1(config-if)# transport input [ssh | telnet]
S1(config-if)# exec-timeout 6 0
S1(config-if)# exit
// CREAZIONE VLAN
S1(config)# vlan 10
S1(config-vlan)# name "OFFICE"
S1(config-vlan)# exit
S1(config)# vlan 88
S1(config-vlan)# name "NATIVE"
S1(config-vlan)# exit
S1(config)# vlan 99
S1(config-vlan)# name "MANAGEMENT"
S1(config-vlan)# exit
// CONFIGURAZIONE LINK VLAN ACCESS
S1(config)# interface fastethernet 0/1
S1(config-if)# switchport mode access
S1(config-if)# switchport access vlan 10
// DISATTIVO PROTOCOLLI DI LINK-AGGREGATION (PAgP, LACP)
S1(config-if)# switchport nonegotiate
S1(config-if)# no shutdown
S1(config-if)# exit
// CONFIGURAZIONE LINK VLAN TRUNK
```

```
S1(config)# interface gigabitethernet 0/0
S1(config-if)# switchport mode trunk
S1(config-if)# switchport trunk allowed vlan [add|remove] 10,88,99
// MODIFICO LA VLAN NATIVA
S1(config-if)# switchport trunk native vlan 88
// DISATTIVO PROTOCOLLI DI LINK-AGGREGATION (PAgP, LACP)
S1(config-if)# switchport nonegotiate
S1(config-if)# exit
// CONFIGURAZIONE VLAN MANGEMENT
S1(config)# interface vlan 99
S1(config-if)# description "DEFAULT-GATEWAY VLAN 99"
S1(config-if)# ip address "192.168.99.1" "255.255.255.0"
S1(config-if)# ipv6 address "2001:db8:acad:99::5/64"
S1(config-if)# ipv6 address "fe80::99:2" link-local
S1(config-if)# ipv6 address dhcp
S1(config-if)# ipv6 address autoconfig
S1(config-if)# exit
// CREAZIONE & CONFIGURAZIONE ETHERCHANNEL PAgP
S1(config)# interface range fastethernet 0/1-3, fastethernet 0/8
S1(config-if-range)# channel-group 1 mode [desirable | auto]
S1(config-if-range)# exit
S1(config)# interface port-channel 1
S1(config-if)# switchport mode trunk
S1(config-if)# switchport trunk allowed vlan 10,88,99
S1(config-if)# exit
// CREAZIONE & CONFIGURAZIONE  ETHERCHANNEL LACP
S1(config)# interface range fastethernet 0/4, fastethernet 0/5-7
S1(config-if-range)# channel-group 2 mode (active | passive)
S1(config-if-range)# exit
S1(config)# interface port-channel 2
S1(config-if)# switchport mode trunk
S1(config-if)# switchport trunk allowed vlan 10,88,99
S1(config-if)# switchport trunk native vlan 88
S1(config-if)# switchport nonegotiate
S1(config-if)# exit
// CONFIGURAZIONE PORT-SECURITY
S1(config)# interface fastethernet 0/1
S1(config-if)# switchport mode access
S1(config-if)# switchport access vlan 10
S1(config-if)# switchport port-security
S1(config-if)# switchport port-security maximum 1
S1(config-if)# switchport port-security aging time 20
S1(config-if)# switchport port-security aging [static | time tie] type [inactivity | absolute]
S1(config-if)# switchport port-security mac-address [sticky | MAC Address]
S1(config-if)# switchport port-security violation [protected | restrict | shutdown]
S1(config-if)# switchport nonegotiate
S1(config-if)# exit
```

```
// SETTO TUTTE LE INTERFACCE NON USATE IN UNA VLAN NON USATA
S1(config)# vlan 999
S1(config-vlan)# name "BLACK-HOLE"
S1(config-vlan)# exit
S1(config)# interface range fastethernet 0/7-24, gigabitethernet0/2
S1(config-if)# description "DISABILITO PORTE NON USATE"
S1(config-if)# shutdown
S1(config-if)# switchport mode access
S1(config-if)# switchport access vlan 999
S1(config-if)# switchport nonegotiate
S1(config-if)# exit
// CONFIGURAZIONE POST-FAST & BPDUGUARD SU INTERFACCIA
S1(config)# interface range fastethernet 0/1-6
S1(config-if)# spanning-tree portfast
S1(config-if)# spanning-tree bpduguard enable
S1(config-if)# exit
// CONFIGURAZIONE POST-FAST & BPDUGUARD GLOBALMENTE
S1(config)# spanning-tree portfast default
S1(config)# spanning-tree portfast bpduguard default
// PROTEZIONE DA ATTACCHI DHCP STARVATION, ROUGE
S1(config)# ip dhcp snooping
S1(config)# ip dhcp snooping vlan 10,20
// CONFIGURAZIONE PORTE TRUSTED
S1(config)# interface fastethernet 0/1
S1(config-if)# ip dhcp snooping trust
S1(config-if)# exit
// CONFIGURAZIONE PORTE UN-TRUSTED
S1(config)# interface fastethernet 0/2
S1(config-if)# ip dhcp snooping limit rate 6
S1(config-if)# exit
// PROTEZIONE DA ATTACCHI ARP SPOOFING/POISONING
S1(config)# ip arp inspection
S1(config)# ip arp inspection vlan 10,20
S1(config)# ip arp inspection validate src-mac dst-mac ip
// CONFIGURAZIONE PORTE TRUSTED
S1(config)# interface fastethernet 0/1
S1(config-if)# ip arp inspection trust
S1(config-if)# exit
// CONFIGURAZIONE PORTE UN-TRUSTED
S1(config)# interface fastethernet 0/2
S1(config-if)# ip arp inspection limit rate 12
S1(config-if)# exit
S1(config)# end
```

TEMPLATE MULTI-LAYER-SWITCH

```
Switch> enable
Switch# configure terminal
Switch(config)# hostname "MLS"
MLS(config)# enable secret "cisco"
MLS(config)# service password-encryption
MLS(config)# enable secret "cisco"
MLS(config)# service password-encryption
MLS(config)# login block-for 30 attempts 2 within 10
MLS(config)# banner motd # "ACCESSO RISERVATO MLS" #
MLS(config)# ipv6 unicast-routing
// CONFIGURAZIONE ACCESSO CAVO CONSOLE
MLS(config)# line console 0
MLS(config-if)# logging synchronous
MLS(config-if)# password "cisco"
MLS(config-if)# login local
MLS(config-if)# exec-timeout 6 0
MLS(config-if)# exit
// CONFIGURAZIONE ACCESSO REMOTO SSH
MLS(config)# ip domain-name "cisco.com"
MLS(config)# ip ssh version 2
MLS(config)# crypto key generate rsa general-keys modulus 1024
MLS(config)# username "ADMIN" privilege 15 secret "cisco"
// CONFIGURAZIONE LINEE VIRTUALI
MLS(config)# line vty 0 15
MLS(config-if)# login local
MLS(config-if)# password "cisco"
MLS(config-if)# transport input [ssh | telnet]
MLS(config-if)# exec-timeout 6 0
MLS(config-if)# exit
// CREAZIONE VLAN
MLS(config)# vlan 10
MLS(config-vlan)# name "OFFICE"
MLS(config-vlan)# exit
MLS(config)# vlan 88
MLS(config-vlan)# name "NATIVE"
MLS(config-vlan)# exit
MLS(config)# vlan 99
MLS(config-vlan)# name "MANAGEMENT"
MLS(config-vlan)# exit
// CONFIGURAZIONE LINK VLAN ACCESS
MLS(config)# interface fastethernet 0/1
MLS(config-if)# switchport mode access
MLS(config-if)# switchport access vlan 10
// DISATTIVO PROTOCOLLI DI LINK-AGGREGATION (PAgP, LACP)
MLS(config-if)# switchport nonegotiate
MLS(config-if)# no shutdown
```

```
MLS(config-if)# exit
// CONFIGURAZIONE LINK VLAN TRUNK
MLS(config)# interface gigabitethernet 0/0
MLS(config-if)# switchport mode trunk
MLS(config-if)# switchport trunk allowed vlan [add|remove] 10,88,99
// MODIFICO LA VLAN NATIVA
MLS(config-if)# switchport trunk native vlan 88
// DISATTIVO PROTOCOLLI DI LINK-AGGREGATION (PAgP, LACP)
MLS(config-if)# switchport nonegotiate
MLS(config-if)# exit
// CREAZIONE & CONFIGURAZIONE ETHERCHANNEL PAgP
MLS(config)# interface range fastethernet 0/1-3, fastethernet 0/8
MLS(config-if-range)# channel-group 1 mode [desirable | auto]
MLS(config-if-range)# exit
MLS(config)# interface port-channel 1
MLS(config-if)# switchport mode trunk
MLS(config-if)# switchport trunk allowed vlan 10,88,9
MLS(config-if)# switchport nonegotiate
MLS(config-if)# exit
// CREAZIONE & CONFIGURAZIONE  ETHERCHANNEL LACP
MLS(config)# interface range fastethernet 0/4, fastethernet 0/5-7
MLS(config-if-range)# channel-group 2 mode (active | passive)
MLS(config-if-range)# exit
MLS(config)# interface port-channel 2
MLS(config-if)# switchport mode trunk
MLS(config-if)# switchport trunk allowed vlan 10,88,99
MLS(config-if)# switchport nonegotiate
MLS(config-if)# exit
// CONFIGURAZIONE LINK ROUTER
MLS(config)# interface gigabitethernet 1/0/2
MLS(config-if)# description "LINK TO R1"
MLS(config-if)# ip address "10.10.10.1" "255.255.255.0"
MLS(config-if)# ipv6 address "2001:db8:acad:115::2/64"
MLS(config-if)# ipv6 address "fe80::115:2" link-local
MLS(config-if)# exit
// ABILITAZIONE E CONFIGURAZIONE INTER-VLAN
MLS(config)# ip routing
MLS(config)# interface vlan 99
MLS(config-if)# description "DEFAULT-GATEWAY VLAN 99"
MLS(config-if)# ip address "192.168.99.1" "255.255.255.0"
MLS(config-if)# exit
// ABILITAZIONE FUNZIONALITA' LAYER 3
MLS(config)# interface gigabitethernet 1/0/1
MLS(config-if)# no switchport
MLS(config-if)# [ip address dhcp | ip address "30.30.30.1" "255.255.255.252"]
MLS(config-if)# no shutdown
MLS(config-if)# exit
```

```
// CONFIGURAZIONE DCHP STATELESS VLAN
MLS(config)# ipv6 dhcp pool "STATELES"
MLS(config-dhcpv6)# dns-server "2001:db8:acad:2::1"
MLS(config-dhcpv6)# domain-name "cisco.com"
MLS(config-dhcpv6)# exit
MLS(config)# interface vlan 20
MLS(config-if)# ip address "192.168.20.1" "255.255.255.0"
MLS(config-if)# ipv6 address "2001:db8:acad:20::1/64"
MLS(config-if)# ipv6 address "fe80::20:1" link-local
MLS(config-if)# no shutdown
MLS(config-if)# ipv6 nd other-config-flag
MLS(config-if)# ipv6 dhcp server "STATELESS"
MLS(config-if)# exit
// CONFIGURAZIONE IP-HELPER DHCP
MLS(config)# interface vlan 10
MLS(config-if)# ip helper-address "10.10.10.1"
MLS(config-if)# exit
MLS(config)# end
```

UTILITY COMMANDS

```
> do [command]
> reload
> sdm prefer duel-ipv4-and-ipv6
> copy running-config startup-config
> clean mac address table
> delete flash:vlan.dat
> erase startup-config -> delete vlan.dat
> no ip domain-lookup
> clear ip nat translation *
> clear ip ospf process
> cdp run / no cdp run
> cdp enable / no cdp enable
> lldp run / no lldp run
> lldp transmit / no lldp transmit
> lldp receive / no lldp receive
> clock set "hh:mm:ss" "mese" "giorno" "anno"
> show clock detail
> show ntp associations
> show ntp status
```

COMMON SHOW COMMANDS

```
> show running-config
> show startup-config
> show logging
> show flash
> show history
> show version
> show ip/ipv6 interface
> show ip/ipv6 interface brief | [include | begin | exclude] "stringa"
> show interface | include "down" | count
> show interfaces status
> show ip arp
> show ip ssh
> show ip/ipv6 route
```

ROUTER SHOW COMMANDS

```
> show ip interface
> show ipv6 route
> show ip dhcp binding
> show ip dhcp pool
> show ip dhcp server statistics
> show ip bgp summary
> show ip protocols
> show ip ospf interface
> show ip ospf neighbor
> show ip tunnel
> show ip nat statistics
> show cdp
> show cdp neighbors [detail]
> show lldp
> show lldp neighbors [detail]
> show access-lists
> show ip nat translation [verbose]
> show ip nat statistics
```

SWITCH SHOW COMMANDS

```
> show interfaces trunk
> show interfaces switchport
> show mac address-table
> show dtp interfaces
> show etherchannel [load-balance | port-channel]
> show spanning-tree
> show vlan brief
> show vlan [id <VLAN-ID> | name <VLAN-Name> | summary]
> show port-security
> show port-security address
> show port-security interface GigabitEthernet0/1
> show ip dhcp snooping binding
> show ip dhcp snooping binding
> show ip arp inspection
```