

Politecnico di Torino

Esami di stato per l'abilitazione all'esercizio della professione di ingegnere

Prima sessione 2006

SEZIONE A

Prova Pratica del 18 luglio 2006

Classe 30/S – Ingegneria delle Telecomunicazioni e Telematica

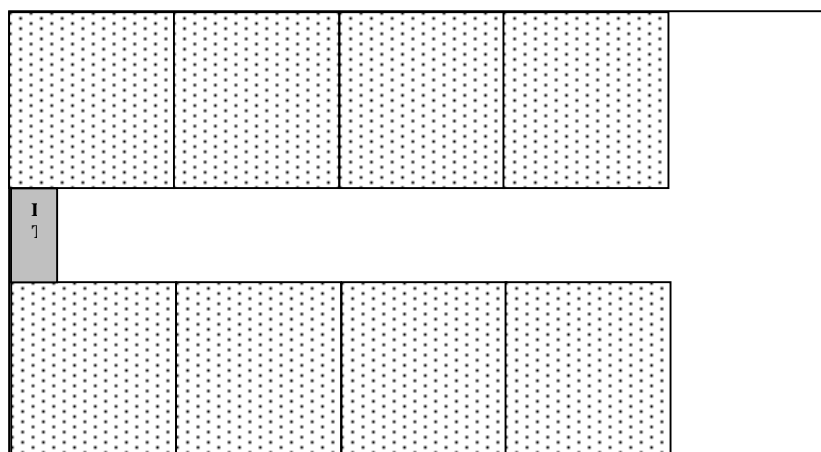
Si chiede al candidato di progettare una rete locale per soli servizi dati utilizzando il protocollo IEEE 802.3 100Base-TX (*Fast Ethernet*).

La rete dovrà essere realizzata in un edificio di tipo industriale, di quattro piani fuori terra a tetto piano, di altezza complessiva pari a metri 16. I tramezzi sono in muratura ed i pavimenti sono rialzati, in modo da consentire il passaggio dei servizi (cavi e tubazioni). Ad ogni piano si trova un locale tecnico (indicato in grigio nello schema di disposizione dei locali e siglato LT) in cui possono essere alloggiate apparecchiature elettroniche, ivi comprese quelle per la trasmissione di dati. Un cavedio verticale unisce tutti i predetti locali tecnici e permette il transito di cavi per trasmissione dati..

In ogni piano dell'edificio si trovano 8 locali quadrati di 196 m^2 ognuno, indicanti con sfondo puntinato nello schema di disposizione dei locali, ognuno dotato di una porta di larghezza pari a 2 m verso il corridoio centrale, posta al centro della parete che divide il locale stesso dal corridoio. In ognuno di essi devono essere previsti i collegamenti per 16 posti di lavoro, ognuno dei quali dovrà essere dotato di 3 prese conformi alle norme TIA 586 (connettore RJ45). Per realizzare la massima flessibilità nella disposizione dei posti di lavoro le prese saranno alloggiate in scatole plastiche lasciate libere sulla soletta di cemento posta al di sotto del pavimento rialzato. Le bretelle di collegamento fra le prese e gli apparati utente saranno realizzate dal cliente e passeranno attraverso appositi fori che il cliente realizzerà nel pavimento rialzato.

Nel locale tecnico a piano terra è stata portata una fibra ottica monomodale a cui è collegato un apparato di trasmissione che permette di raggiungere un Internet Service Provider con un collegamento simmetrico a 10 Mb/s. L'interfaccia verso la rete aziendale è di tipo IEEE 802.3 100Base-TX.

Si chiede al candidato di fare un progetto di massima della rete, descrivendone la struttura, motivando chiaramente le scelte fatte, nel caso vi siano diverse possibili strutture di rete che possano soddisfare le specifiche di progetto, ed indicando chiaramente quanti e quali apparati si ritiene necessario utilizzare, nonché dove essi saranno posizionati all'interno dell'edificio.



Pianta piani
fuori terra

NETWORKING SOLUTIONS

Switching

10/100 and Gigabit Ethernet Switching		PORT CAPACITY							FUNCTIONALITY				PERFORMANCE		SERVICE
Product	Order Number	Height	Module Slots per unit / stack	10/100 Ports per unit / stack	100BASE-FX per unit / stack	10/100/1000 Ports per unit / stack	1000BASE-X Ports per unit / stack ¹	IEEE 802.1X User Login Security	IEEE 802.3ad Power over Ethernet	QoS / Traffic Prioritization	Priority Queues	VLANs / Max Number	Switching Capacity (Max)	Forwarding Rate (Max)	Service Order Number
3COM SWITCH 4500 FAMILY															
3Com Switch 4500 26-Port	3CR17561-91	1RU	4 / 32	24 / 192	2 / 16	2 / 16	2 / 16	Yes	Yes	Yes	8	Yes / 256	8.8 Gbps	6.5 Mpps	3CS-3YREXP74-02
3Com Switch 4500 50-Port	3CR17562-91	1RU	4 / 32	48 / 384	2 / 16	2 / 16	2 / 16	Yes	Yes	Yes	8	Yes / 256	13.6 Gbps	10.1 Mpps	3CS-3YREXP74-04
3Com Switch 4500 PWR 26-Port	3CR17571-91	1RU	2 / 16	24 / 192	2 / 16	2 / 16	2 / 16	Yes		Yes	8	Yes / 256	8.8 Gbps	6.5 Mpps	3CS-3YREXP74-04
3Com Switch 4500 PWR 50-Port	3CR17572-91	1RU	4 / 32	48 / 384	2 / 16	2 / 16	2 / 16	Yes		Yes	8	Yes / 256	13.6 Gbps	10.1 Mpps	3CS-3YREXP74-05
3COM SUPERSTACK 3 SWITCH FAMILY															
3Com SuperStack 3 Switch 4400 24-Port	3C17203	1RU	2 / 8	24 / 192	2 / 8	2 / 8 ²	2 / 8	Yes		Yes	4	Yes / 64	8.8 Gbps	6.6 Mpps	3CS-EXP74-04
3Com SuperStack 3 Switch 4400 48-Port	3C17204	1RU	2 / 8	48 / 384	2 / 8	2 / 8 ²	2 / 8	Yes		Yes	4	Yes / 64	13.6 Gbps	10.1 Mpps	3CS-EXP74-05
3Com SuperStack 3 Switch 4400 PWR	3C17205	1RU	2 / 8	24 / 192	2 / 8	2 / 8 ²	2 / 8	Yes	Yes	Yes	4	Yes / 64	8.8 Gbps	6.6 Mpps	3CS-EXP74-04
3Com SuperStack 3 Switch 4400 FX	3C17210	1RU	2 / 8		24 / 192	2 / 8 ²	2 / 8	Yes		Yes	4	Yes / 64	8.8 Gbps	6.6 Mpps	3CS-EXP74-05
3Com SuperStack 3 Switch 4400 SE	3C17206	1RU	2 / 8	24 / 192	2 / 8	2 / 8 ²	2 / 8	Yes		Yes	4	Yes / 64	8.8 Gbps	6.6 Mpps	3CS-EXP74-02
3Com SuperStack 3 Switch 4250T	3C17302	1RU		48 / 192		2				Yes	2	Yes / 60	13.6 Gbps	10.1 Mpps	3CS-EXP74-04
3Com SuperStack 3 Switch 4228S	3C17304	1RU		24 / 96		2	2 / 8			Yes	2	Yes / 60	12.8 Gbps	9.5 Mpps	3CS-EXP74-02
3Com SuperStack 3 Switch 4226T	3C17300	1RU		24 / 96		2				Yes	2	Yes / 60	8.8 Gbps	6.6 Mpps	3CS-EXP74-02
3Com SuperStack 3 Switch 3870 24-Port	3CR17450-91	1RU	1			24 / 384	4 / 32	Yes		Yes	8	Yes / 254	108 Gbps	80 Mpps	3CS-EXP74-05
3Com SuperStack 3 Switch 3870 48-Port	3CR17451-91	1RU	1			48 / 384	4 / 32	Yes		Yes	8	Yes / 254	156 Gbps	115 Mpps	3CS-EXP74-05
3Com SuperStack 3 Switch 3848	3CR17402-91	1RU				48	4	Yes		Yes	8	Yes / 254	96 Gbps	71 Mpps	3CS-EXP74-05
3Com SuperStack 3 Switch 3824	3C17400	1RU				24	4	Yes		Yes	8	Yes / 254	48 Gbps	35.7 Mpps	3CS-EXP74-05
3Com SuperStack 3 Switch 3812	3C17401	1RU				12	4	Yes		Yes	8	Yes / 254	24 Gbps	17.8 Mpps	3CS-EXP74-04
3Com SuperStack 3 Switch 3250	3CR17501-91	1RU				2	2	Yes		Yes	4	Yes / 255	13.6 Gbps	10.1 Mpps	3CS-EXP74-04
3Com SuperStack 3 Switch 3226	3CR17500-91	1RU				2	2	Yes		Yes	4	Yes / 255	8.8 Gbps	6.6 Mpps	3CS-EXP74-02

1 Includes 1000BASE-SX, 1000BASE-LX and/or SFP.
2 Connectivity is 1000BASE-T only.



SPOTLIGHT

3Com Switch 4500 Family
(3CR17561-91, 3CR17562-91, 3CR17571-91, 3CR17572-91)

The 3Com Switch 4500 Family of managed, stackable 10/100 Ethernet switches provides secure, flexible LAN connectivity for small to medium enterprise and branch office networks. The Switch 4500 Family offers Layer 2 switching and dynamic Layer 3 routing, as well as robust security, Quality of Service, and management features to deliver intelligent edge connectivity for essential business applications.

FEATURES AND BENEFITS:

- Secure the Network**
Protect network's resource's and information with essential security features that provide user and device authentication, enforce access control for switch management, and enhance overall network security
- Empower Application Convergence**
Ensure essential applications get priority with the Switch 4500 family's combination of high-performance switching, Quality of Service, and advanced traffic management features. 3Com Smart PoE delivers intelligent power management with dynamic allocation of available power resources
- Simplify Voice over IP (VoIP)**
Automate configuration, detect IP phones, dynamically assign switch ports to the Voice VLAN and prioritize VoIP traffic using the unique Voice VLAN feature. Effectively minimize the cost and complexity associated with adding or moving IP phones
- Cost Effective**
Delivering Power over Ethernet capability means electricity and data are provided over a single Ethernet cable, resulting in significant cost savings when deploying devices such as IP phones, wireless access points, and IP security cameras
- Scalable Switching Solution**
Flexible in design, the switches have user-configurable dual-personality Gigabit Ethernet interfaces and the ability to stack up to eight switch units (384 10/100 connectivity ports) that can be managed as a single entity
- Enhance Management and Control**
Improve business productivity by reliably supporting business applications and facilitate ease of use with features such as dynamic routing with RIP (Routing Information Protocol), auto-negotiation on ports, Auto MDI/MDIX, plus access to management features via command line interface or SNMP management software

Baseline Plus and Baseline Switches		PORT CAPACITY			MANAGEMENT	FUNCTIONALITY				SERVICE	
		Height	10/100 Ports	10/100/1000 Ports	Gigabit Uplink Ports	Smart Managed	Link Aggregation	QoS	VLANs	Power over Ethernet	Service Order Number
Product	Order Number										
3COM BASELINE PLUS FAMILY											
3Com Baseline Switch 2824-SFP Plus	3C16487	1 RU	24	4 (SFP)	Yes	Yes	Yes	Yes	Yes		3CS-EXP74-02
3Com Baseline Switch 2816-SFP Plus	3C16485A	1 RU	16	4 (SFP)	Yes	Yes	Yes	Yes	Yes		3CS-EXP74-02
3Com Baseline Switch 2226 PWR Plus	3C16490	1 RU	24	2 (1000BASE-T or SFP)	Yes	Yes	Yes	Yes	Yes	Yes	3CS-EXP74-04
3Com Baseline Switch 2226 Plus	3C16475BS	1 RU	24	2 (1000BASE-T or SFP)	Yes	Yes	Yes	Yes	Yes		3CS-EXP74-01
3Com Baseline Switch 2250 Plus	3C16476BS	1 RU	48	2 (1000BASE-T or SFP)	Yes	Yes	Yes	Yes	Yes		3CS-EXP74-02
3COM BASELINE FAMILY											
3Com Baseline Switch 2824	3C16479	1 RU	24								3CS-EXP74-04
3Com Baseline Switch 2816	3C16478	1 RU	16								3CS-EXP74-02
3Com Baseline Switch 2808	3C16477A	1 RU	8								3CS-EXP74-01
3Com Baseline Switch 2126-G	3C16472	1 RU	24	2 (1000BASE-T)							3CS-EXP74-01
3Com Baseline Switch 2024	3C16471	1 RU	24								3CS-EXP74-01
3Com Baseline Switch 2016	3C16470	1 RU	16								3CS-EXP74-01

SPOTLIGHT

3Com Baseline Switch 2824-SFP Plus
(3C16487)

The 3Com Baseline Plus Family provides a unique combination of performance, quality, and network management and control capabilities in a value-priced switch.

FEATURES AND BENEFITS:

- Wire-Speed Performance**
Support today's demanding applications with high-capacity Gigabit Ethernet connectivity
- Flexible, Configurable Gigabit Uplinks**
Allow flexible media support with modular SFP Gigabit interfaces
- Exceptional Value Rack-Mountable Switching**
Deliver fast, reliable connectivity with intuitive web-based management at a very affordable price
- Limited Lifetime Warranty**
Support 24x7 availability with an industry-leading warranty



SPOTLIGHT

3Com SuperStack 3 Switch 3870 Family
(3CR17450-91, 3CR17451-91)

The 3Com SuperStack 3 Switch 3870 Family of switches provide scalable, wire-speed Gigabit Ethernet connectivity for affordable "Gigabit-to-the-Desktop" connectivity.

FEATURES AND BENEFITS:

- Affordable Gigabit-to-the-Desktop Switching**
Provide scalable bandwidth for increasingly demanding business applications
- Investment Protection**
Gain protection unmatched by competing products in its class with available 10-Gigabit uplink and Layer 3 routing (via software upgrade)
- Robust Feature Set in Support of Secure Converged Networks**
Enhance security with features such as 802.1X network login, RADIUS authentication, and SSH/SSL management access. Traffic prioritization and Quality of Service features enable convergence of IP telephony and other emerging applications
- Limited Lifetime Warranty**
Support 24x7 availability with an industry-leading warranty

