School of Computer Science
University of Lincoln

CMP2803M Network Fundamentals

Assessment 1
Designing a network

UNIVERSITY OF
LINCOLN

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BSc/MComp Computer Science
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Contents

Network device passwords & Setup

For all routers and switches, the username is 'cisco' and the password is 'class'. The enable password for the cisco ASA firewall is also set to 'class'.

EIGRP is the routing protocol used. VLANs are connected from switch to router using the 'router on a stick' method.

Variable Length Subnet Mask (VLSM) & Subnetting

'Nodes' refers to the total available IP addresses for a subnet, and 'Extra' refers to the extra IP addresses provided by the subnet over the default amount needed at this given time. For each location (except comms), each subnet is in its own VLAN, indicated in the logical diagram following.

Router-Router

Routers	192.20.1.0							
Router-Router	**128**	**64**	**32**	**16**	**8**	**4**	**2**	**1**
AB	1	1	1	1	1	1	0	0
CD	1	1	1	1	1	1	0	0
AC	1	1	1	1	1	1	0	0
BC	1	1	1	1	1	1	0	0
BD	1	1	1	1	1	1	0	0
AD	1	1	1	1	1	1	0	0
Bcomms	1	1	1	1	1	1	0	0
InternetFireWall	1	1	1	1	1	1	0	0

Router-Router	Net ID	1st	Last	Broadcast	IP	Mask
AB	0	1	2	3	192.20.1.0	/30
CD	4	5	6	7	192.20.1.4	/30
AC	8	9	10	11	192.20.1.8	/30
BC	12	13	14	15	192.20.1.12	/30
BD	16	17	18	19	192.20.1.16	/30
AD	20	21	22	23	192.20.1.20	/30
Bcomms	24	25	26	27	192.20.1.24	/30
InternetFW	28	29	30	31	192.20.1.28	/30
END	32					

Location A

A	192.30.1.0						
128	**64**	**32**	**16**	**8**	**4**	**2**	**1**

Sales=28							
1	1	1	0	0	0	0	0
Finance=7							
1	1	1	1	0	0	0	0
Tech=4							
1	1	1	1	1	0	0	0
Management=3							
1	1	1	1	1	0	0	0
Admin=5							
1	1	1	1	1	0	0	0

Subnet	Net ID	1st	Last	Broadcast	IP	Mask	Nodes	Extra
sales	0	1	30	31	192.30.1.0	/27	30	2 extra
Finance	32	33	46	47	192.30.1.32	/28	14	7 extra
Admin	48	49	54	55	192.30.1.48	/29	6	1 extra
Tech	56	57	62	63	192.30.1.56	/29	6	2 extra
Management	64	65	70	71	192.30.1.64	/29	6	3 extra
End	72						Total= 62	Extra = 15

Location B

B	192.30.2.0						
128	64	32	16	8	4	2	1
Finance=9							
1	1	1	1	0	0	0	0
Tech = 6							
1	1	1	1	1	0	0	0
Design =10							
1	1	1	1	0	0	0	0
management=10							
1	1	1	1	0	0	0	0
Admin=15							
1	1	1	0	0	0	0	0

Subnet	Net ID	1st	Last	Broadcast	IP	Mask	Nodes	Extra
Admin	0	1	30	31	192.30.2.0	/27	30	15 extra
Management	32	33	46	47	192.30.2.32	/28	14	4 extra
Design	48	49	62	63	192.30.2.48	/28	14	4 extra
Finance	64	65	78	79	192.30.2.64	/28	14	5 extra
Tech	80	81	86	87	192.30.2.80	/29	6	0 extra
End	88						Total = 78	Extra= 28

Main Communications Room

128	64	32	16	8	4	2	1

1	1	1	0	0	0	0	0

Net ID	1st	Last	Broadcast	IP	Mask	Nodes
0	0	30	31	192.30.5.0	/27	30
	32					

Location C

Originally, I did not account for an extra subnet:

C	192.30.3.0						
128	64	32	16	8	4	2	1
Sales=26							
1	1	1	0	0	0	0	0
tech = 4							
1	1	1	1	1	0	0	0
management =3							
1	1	1	1	1	0	0	0
Admin=5							
1	1	1	1	1	0	0	0
Extra=7							
1	1	1	1	0	0	0	0

Subnet	Net ID	1st	Last	Broadcast	IP	Mask	Nodes	Extra
Sales	0	1	30	31	192.30.3.0	/27	30	4 extra
Admin	32	33	38	39	192.30.3.32	/29	6	1 extra
Tech	40	41	46	47	192.30.3.40	/29	6	2 extra
Management	48	49	54	55	192.30.3.48	/29	6	3 extra
End	56							
							Total = 48	Extra= 10

Need 7 more Ips for nodes

However, I "VLSM'd" with an extra subnet to allow up to 55 devices. The following is the addressing scheme I used for location C.

Subnet	Net ID	1st	Last	Broadcast	IP	Mask	Nodes	Extra
Sales	0	1	30	31	192.30.3.0	/27	30	4 extra
Extra	32	33	46	47	192.30.3.32	/28	14	7 extra
Admin	48	49	54	55	192.30.3.48	/29	6	1 extra
Tech	56	57	62	63	192.30.3.56	/29	6	2 extra
Management	64	65	70	71	192.30.3.64	/29	6	3 extra
End	72						Total=62	Extra=17

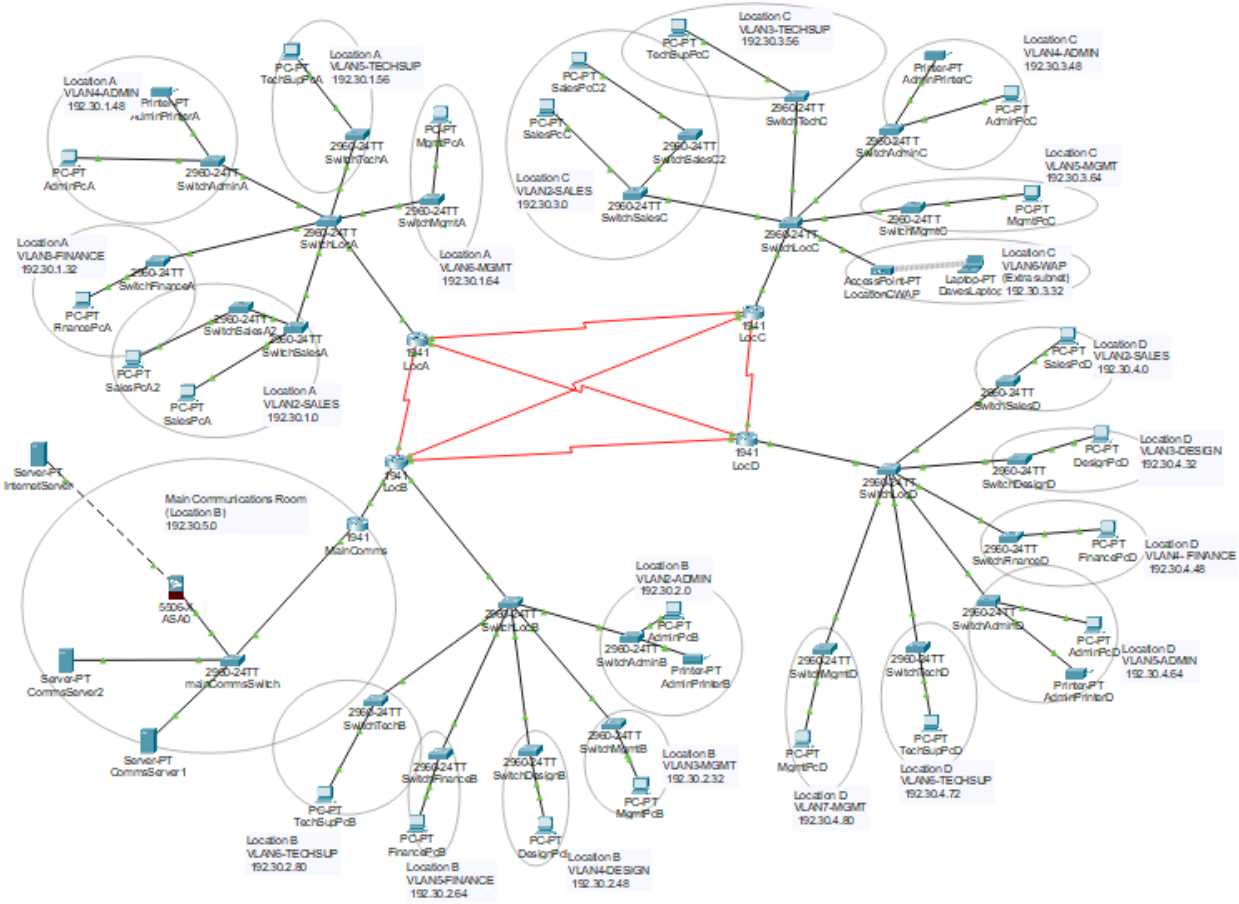
Location D

192.30.4.0

64	32	16	8	4	2	1
1	1	0	0	0	0	0
1	1	1	0	0	0	0
1	1	1	1	0	0	0
1	1	1	0	0	0	0
1	1	1	1	0	0	0
1	1	1	1	0	0	0

Net ID	1st	Last	Broadcast	IP	Mask	Nodes	Extra
0	1	30	31	192.30.4.0	/27	30	15 extra
32	33	46	47	192.30.4.32	/28	14	6 extra
48	49	62	63	192.30.4.48	/28	14	7 extra
64	65	70	71	192.30.4.64	/29	6	1 extra
72	73	78	79	192.30.4.72	/29	6	2 extra
80	81	86	87	192.30.4.80	/29	6	3 extra
88						Total=76	Extra=34

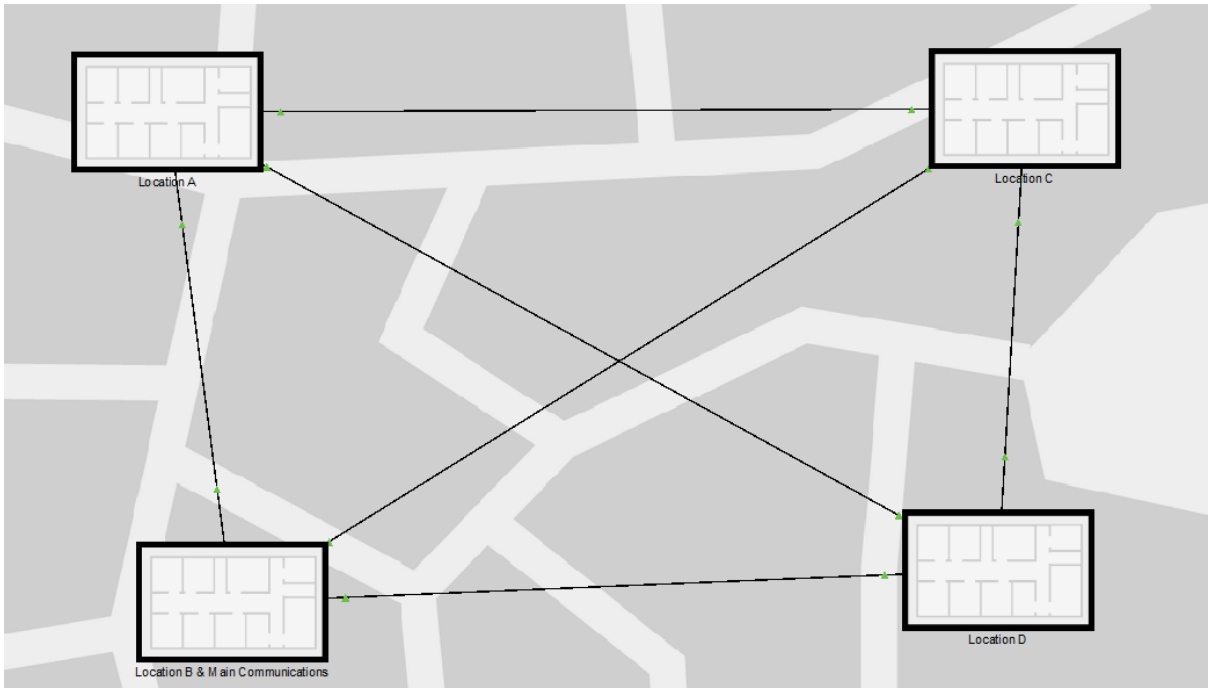
Logical Topology Diagram



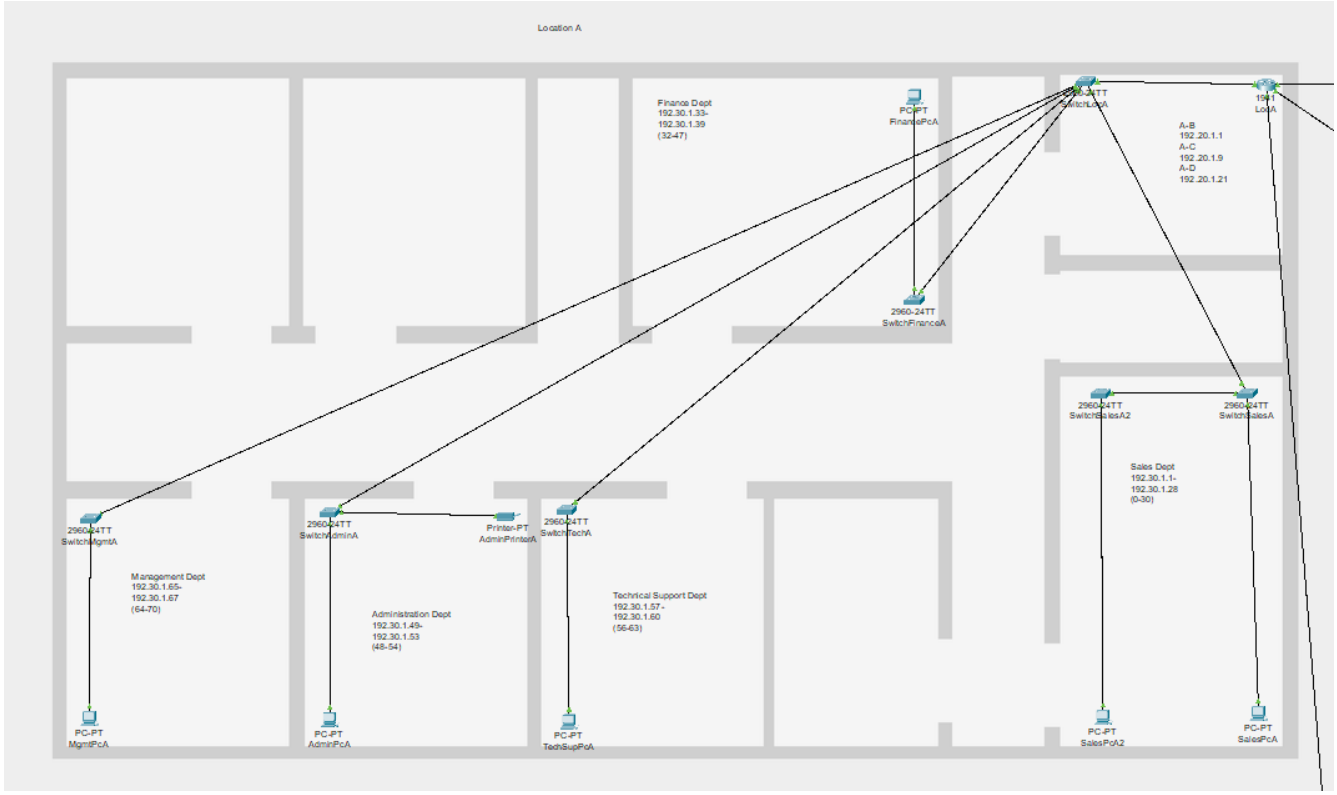
Physical Topology Diagrams

The following physical topology diagrams contain the range of IP addresses assigned to networking devices in each department in each building. In brackets states the last octets of the full range of available IPs (including network & broadcast IP) that are available if scaling up the department.

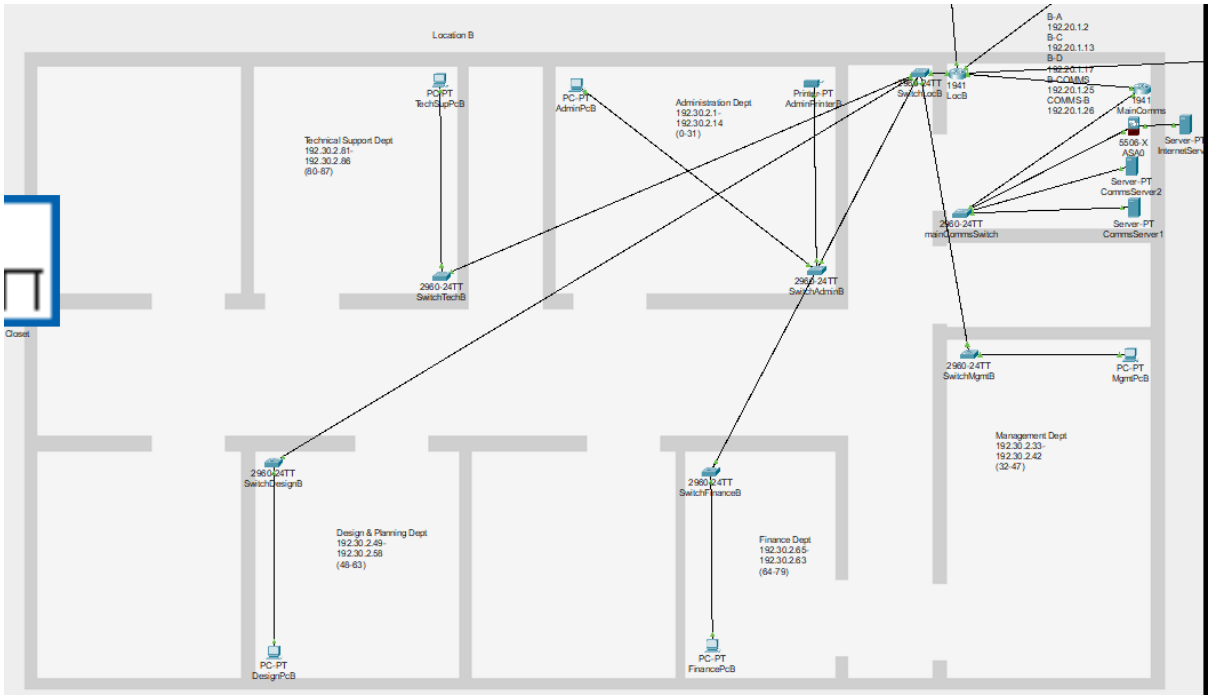
Location-Location(Full mesh)



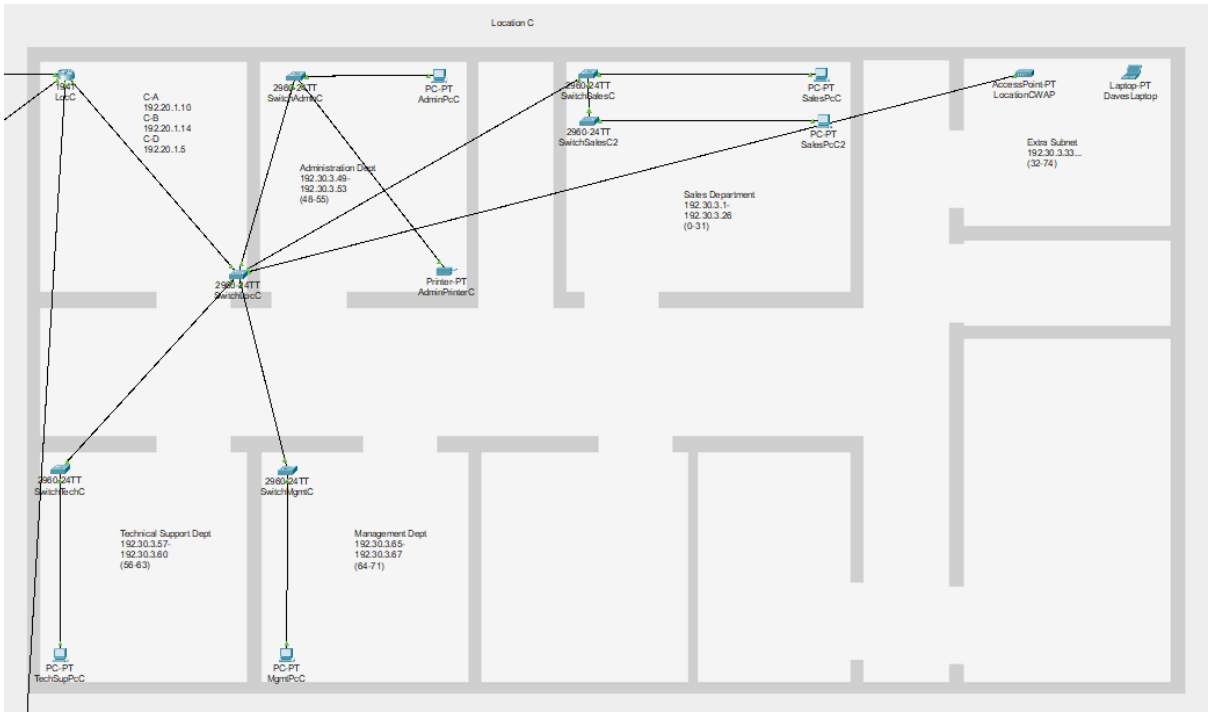
Location A



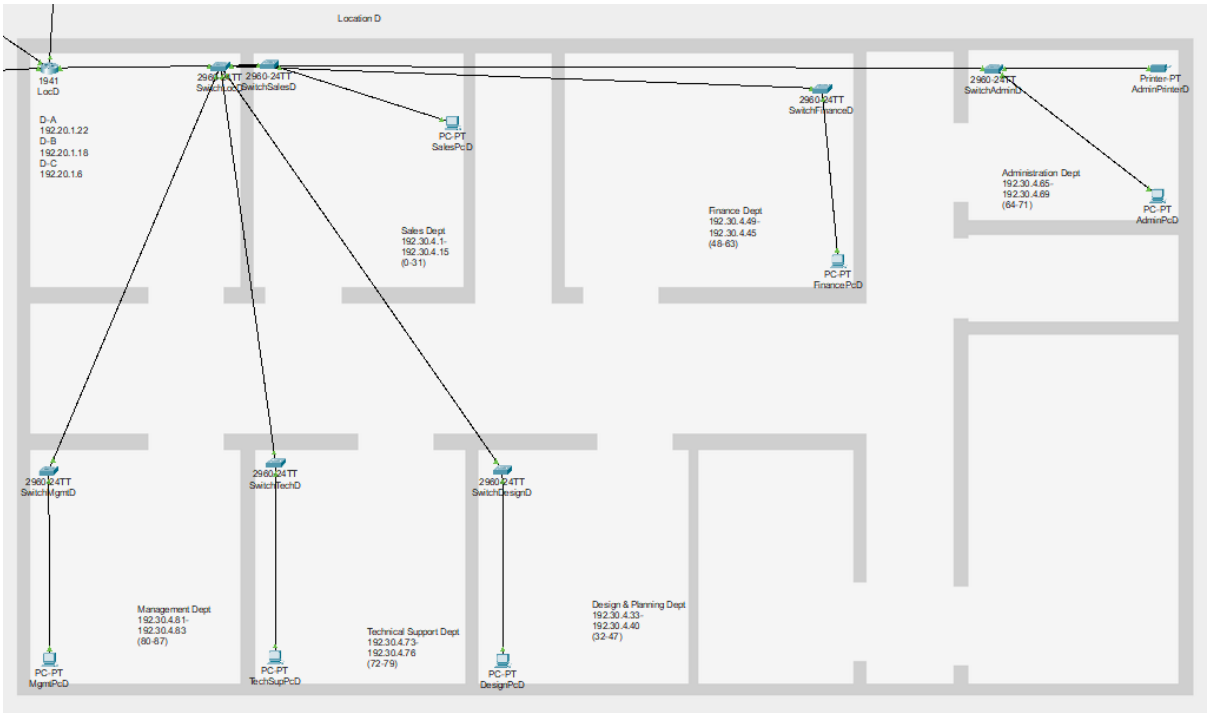
Location B & Main Communications Room



Location C



Location D


Location D
1941
LocD
D-A
192.20.1.22
D-B
192.20.1.18
D-C
192.20.1.6
2960-24TT
SwitchLocD
2960-24TT
SwitchSalesD
PC-PT
SalesPcD
Sales Dept
192.30.4.1-
192.30.4.15
(0-31)
2960-24TT
SwitchFinanceD
Finance Dept
192.30.4.49-
192.30.4.45
(48-63)
PC-PT
FinancePcD
2960-24TT
SwitchAdminD
Printer-PT
AdminPrinterD
Administration Dept
192.30.4.65-
192.30.4.69
(64-71)
PC-PT
AdminPcD
2960-24TT
SwitchMgmtD
2960-24TT
SwitchTechD
2960-24TT
SwitchDesignD
Management Dept
192.30.4.81-
192.30.4.83
(80-87)
Technical Support Dept
192.30.4.73-
192.30.4.76
(72-79)
Design & Planning Dept
192.30.4.33-
192.30.4.40
(32-47)
PC-PT
MgmtPcD
PC-PT
TechSupPcD
PC-PT
DesignPcD