This is a fairly long document because I included all my problems and the troubleshooting

**NETWORK SETUP/SUMMARY**

So, essentially I’m using two ranges - One for router to router communication (192.168.0.0)

And a second range for my department subnets (192.168.1.0)

**DEPARTMENT SUBNETS**

My departments are on a single ip range of 192.168.1.0, separated into 4 subnets.

This in turn means we’re using the subnet mask of 255.255.255.192

MAX SUBNETS: 4.

MAX NUMBER OF USABLE HOSTS: 62 per subnet.

SUBNETS USED: 4, all 4 are used, one per department.

**ROUTER SUBNETS**

MAX SUBNETS: 16

MAX NUMBER OF USABLE HOSTS: 14 per subnet

SUBNETS USED: 1, we only need 1 because we’ve only got 4 routers so we’re only using 4 of a 14 possible hosts per subnet.

My routers are on a single subnet of the range 192.168.0.0, using the subnet mask of 255.255.255.240. This is because I’ve only got 4 of them. So a maximum number of usable hosts count of 14 is all I really need, in comparison to a department subnet where adding more PC’s is potentially likely, far more so than adding another router.

Each of the 4 rather simply labelled 192.168.0.1, 192.168.0.2 etc for ease - because I encountered issues with other values, so just decided to go with those for ease.

Table below should comprehensively illustrate my IP’s.

|  |  |
| --- | --- |
| **MARKETING ROUTER**  Router to router ip: 192.168.0.1  Subnet mask: 255.255.255.240  **MARKETING SUBNET**  SUBNET ADDRESS: 192.168.1.0  MARKETING ROUTER: 192.168.1.1  Subnet Mask: 255.255.255.192  Gateway to all PC’s: 192.168.1.1  PC 1 IP:192.168.1.2 PC 2 IP:192.168.1.3  PC 3 IP:192.168.1.4 PC 4 IP:192.168.1.5  PC 5 IP:192.168.1.6 | **FINANCE ROUTER**  Router to router ip: 192.168.0.2  Subnet mask: 255.255.255.240  **FINANCE SUBNET**  SUBNET ADDRESS: 192.168.1.64  FINANCE ROUTER: 192.168.1.65  Subnet Mask: 255.255.255.192  Gateway to all PC’s: 192.168.1.65  PC 1 IP:192.168.1.66 PC 2 IP:192.168.1.67  PC 3 IP:192.168.1.68  PC 4 IP:192.168.1.69  PC 5 IP:192.168.1.70 |
| **SALES ROUTER**  Router to router ip: 192.168.0.3  Subnet mask: 255.255.255.240  **SALES SUBNET**  SUBNET ADDRESS: 192.168.1.128  SALES ROUTER: 192.168.1.129  Subnet Mask: 255.255.255.192  Gateway to all PC’s: 192.168.1.129  PC 1 IP:192.168.1.130 PC 2 IP:192.168.1.131  PC 3 IP:192.168.1.132 PC 4 IP:192.168.1.133  PC 5 IP:192.168.1.134 | **CUSTOMER SERVICES ROUTER**  Router to router ip: 192.168.0.4  Subnet mask: 255.255.255.240  **CUSTOMER SERVICES SUBNET**  SUBNET ID: 192.168.1.192  CUSTOMER SERVICES ROUTER: 192.168.1.193  Subnet Mask: 255.255.255.192  Gateway to all PC’s: 192.168.1.193  PC 1 IP:192.168.1.194 PC 2 IP:192.168.1.195  PC 3 IP:192.168.1.196 PC 4 IP:192.168.1.197  PC 5 IP:192.168.1.198 |

**Static IP Routes**

Marketing has routes to Sales and Finance

192.168.1.64 (Finance subnet) via 192.168.0.2 (Finance Router)

192.168.1.128 (Sales subnet) via 192.168.0.3 (Sales Router)

Sales has routes to Finance and Marketing

192.168.1.64 (Finance subnet) via 192.168.0.2 (Finance Router)

192.168.1.0 (Marketing subnet) via 192.168.0.1 (Marketing Router)

Finance has routes to Marketing and Sales

192.168.1.128 (Sales subnet) via 192.168.0.3 (Sales Router)

192.168.1.0 (Marketing subnet) via 192.168.0.1 (Marketing Router)

Customer Services has no routes as it has no requirement to communicate with other clients.

**PROBLEMS/TESTING**

|  |  |  |
| --- | --- | --- |
| Test (conducted 24/11/20) | Result | Pass/Fail |
| Marketing subnet client communication | Ping Succeed - all computers on same subnet | PASS |
| Sales subnet client communication | Ping Succeed - all computers on same subnet | PASS |
| Finance subnet client communication | Ping Succeed - all computers on same subnet | PASS |
| Customer Services subnet client communication | Ping Succeed - all computers on same subnet | PASS |
| Marketing subnet client  communication | Ping Succeed - Router nic set as gateway | PASS |
| Sales subnet client communication | Ping Succeed - Router nic set as gateway | PASS |
| Finance subnet client communication | Ping Succeed - Router nic set as gateway | PASS |
| Customer Services subnet client communication | Ping Succeed - Router nic set as gateway | PASS |

I only tested this far as at this point no testing relating to router - other subnet router was working, I basically spent all of Tuesday 24th trying to figure out what my issue was: I couldn’t ping any other routers beyond the one directly connected to the client (so sales PC’s couldn’t ping the marketing router) for instance and my static routing would not work whatsoever.

On the 25th, I figured it out. The answer was fairly simple - the issue was my routers were all on different subnets for router to router communication, and therefore could not communicate, putting them all on a single subnet meant that it started working. I’m pretty sure this is right. Originally I had split them into a similar 4 subnets and each router had an ip of 192.168.0.1, 192.168.0.65 etc, however this wasn’t working. This makes sense in hindsight. This also in turn means that I must recognize my system is not the most efficient as I could have more than 4 subnets on a single range and then used one for my routers, but I don’t think it’s a problem to have a separate ip range for my routers, even if they’re only using one very small subnet - not the most efficient, but a neater to my mind so I’m going to use it anyway.

DOES IT MEET THE BRIEF?

* Yes, there are 4 subnets, one for each department all on a single ip range.
* Each router is connected to at least 1 switch, in fact they’re all connected to 2 - due to the fact that my network makes use of a main switch for routing in comparison to serial ports or direct ethernet connections to each other.
* Each subnet does contain 5 computers.
* To my knowledge, all network devices are configured correctly.
* Computers on the same subnet can ping each other
* Sales, Marketing and Finance can ping each other
* Customer Services is physically connected but cannot communicate with other department PC’s (due to the static routing not being set up for it.)
* There are no public facing servers due to the fact it’s a class C private network.

FULL TESTING TABLE

Testing date: 25/11/20

|  |  |  |
| --- | --- | --- |
| Testing | Expected results | Pass/fail |
| Test marketing subnet client communication | Ping succeed:all computers on same subnet | PASS |
| Test Marketing client -> marketing router  communication | Ping succeed:Router NIC set as gateway for marketing clients | PASS |
| Test Marketing client -> Finance Router communication | Ping succeed:Marketing router should forward ping onto Finance router | PASS |
| Test marketing client -> finance client communication | Ping succeed:Marketing router should forward traffic to Finance subnet | PASS |
| Test marketing client -> sales client communication | Ping succeed:Marketing router should forward traffic to sales subnet | PASS |
| Test marketing client -> customer services client communication | Ping fail: customer services client should be unable to ping other departments | PASS |
| Test Finance subnet client communication | Ping succeed:all computers on same subnet | PASS |
| Test finance client -> finance router  communication | Ping succeed:Router NIC set as gateway for finance clients | PASS |
| Test Finance client -> sales  router communication | Ping succeed:Finance router should forward ping onto sales router | PASS |
| Test Finance client -> marketing client communication | Ping succeed:Finance router should forward traffic to marketing subnet | PASS |
| Test Finance client -> sales client communication | Ping succeed:Finance router should forward traffic to sales subnet | PASS |
| Test Finance client -> customer services client communication | Ping fail: customer services client should be unable to ping other departments | PASS |
| Test Sales subnet client communication | Ping succeed:all computers on same subnet | PASS |
| Test sales client -> sales router communication | Ping succeed:Router NIC set as gateway for sales clients | PASS |
| Test sales client -> marketing router communication | Ping succeed:sales router should forward ping onto marketing router | PASS |
| Test sales client -> finance client communication | Ping succeed:sales router should forward traffic to finance subnet | PASS |
| Test sales client -> marketing client communication | Ping succeed:sales router should forward traffic to marketing subnet | PASS |
| Test sales client -> customer services client communication | Ping fail: customer services client should be unable to ping other departments | PASS |
| Test Customer services client communication | Ping succeed:all computers on same subnet | PASS |
| Test customer services -> customer services communication | Ping succeed:Router NIC set as gateway for Customer services clients | PASS |
| Test customer services client -> sales  router communication | Ping fail: no requirement of customer services to communicate between other networks. | PASS |
| Test customer services client -> marketing client communication | Ping fail: customer services client should be unable to ping other departments | PASS |
| Test customer services client -> finance client communication | Ping fail: customer services client should be unable to ping other departments | PASS |
| Test customer services client -> sales client communication | Ping fail: customer services client should be unable to ping other departments | PASS |

I hope this write up is sufficient to meet the brief of the assessment.