

## CCDE Challenge – Mela-Construction Group

Story Focus, highlight all that apply:

Merge/Acquire    Divest    Tech-Insert    Scale

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Mela-Construction Group is the largest privately owned construction company within the UK which operates in both the public and private sectors throughout the UK and Europe boasting an impressive £800m annual turnover. The company now employs approximately 1200 people at various regional offices and construction sites throughout the UK where a recruitment drive has been underway to increase the workforce by 10% in the next 18 months following the upturn in the economy and successful project wins across the organisation's various divisions. The group is comprised of three main divisions which specialise in residential housebuilding, commercial property construction (stadiums, shopping centres etc) and property development named Mela-Residential, Mela-Commercial and Mela-Ventures respectively. Each organisation's IT connectivity and applications are managed by a centralised Mela-Group IT team and connectivity to the corporate network is provided either via MPLS L3VPN Ethernet fibre, DSL or an EFM circuit. Alternatively, software based IPSec VPN clients provide remote access via the internet for roaming users such as those who work for Mela-Ventures and home based users such as sub-contractors and internal Architectural Technicians who develop building drawings and plans remotely then upload to the corporate document management systems. The majority of remote access users are either typically 100% home based other than visits to the office for quarterly / team meetings, or travel frequently between the UK and Europe to transact business internationally and are "on the road" for long periods of time, but typically do not have access to a WAN connected office / site.

The Mela-Group's main profit margin comes from new build housing sales and completion in the Mela-Residential division, where aggressive quarterly sales targets are set by the Mela-Residential board and overall Mela-Construction Group executives against each region. The revenue and turnover of Mela-Residential accounts for 65% of the overall Mela-Construction Group's annual turnover.

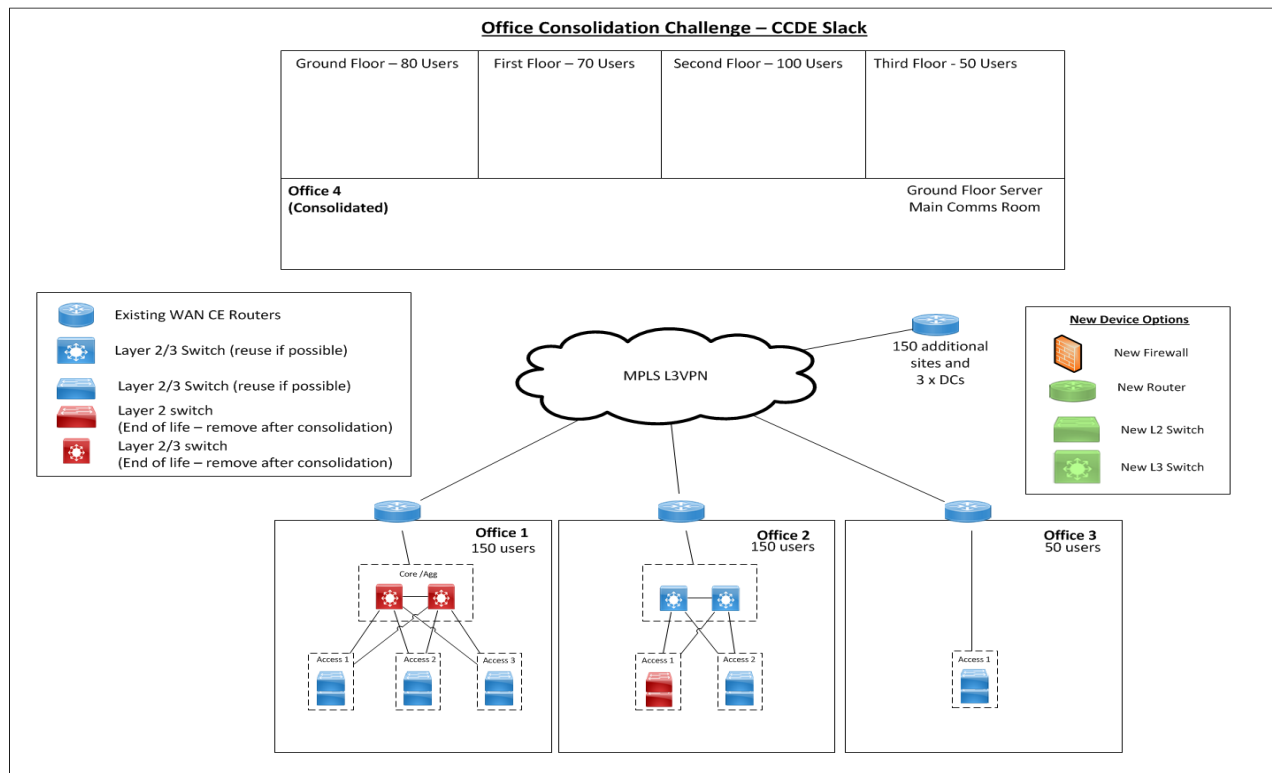
The Mela-Residential division's connectivity to the Wide Area Network consists of 24 MPLS based "static" traditional regional office buildings located throughout the UK, in addition to approximately 160 "active" residential housebuilding construction site locations. The 24 traditional offices connect to the corporate MPLS L3VPN network in the Mela-Group VRF which is currently shared between all divisions and there is no segregation between Residential, Commercial and Ventures Divisions. Each regional office is connected to the MPLS WAN using dual homed circuits; typically, Ethernet fibre with full or sub rate bandwidth available on the circuits as the primary and FTTC, ADSL2+ or a 20Mbps symmetric EFM service for the secondary circuit. ADSL2+ provides around 7Mbps download and 1Mbps upload where FTTC can provide either 40/10Mbps or 80/20Mbps download/upload bandwidth depending on coverage and product selection. Performance is acceptable in general except some offices have reported that issues are experienced on the primary circuit when large drawings are sent or received via Email, or uploaded to the document management system which has a web based front end, but is located within the HQ data centre / server room in the Edinburgh office. The Customer care application also has performance issues when performing functions such as database queries for customers, where this worked better when there were local servers located at each regional office.

The Colchester and Slough regional offices, were part of a recent acquisition of a small local housebuilder in the South of England called Fairbuy Housing and these offices have single Ethernet circuits with an encryption overlay deployed. The circuits were novated from the incumbent telco to the Mela-Group MPLS WAN which is fully managed (including CEs) by a UK based ISP named Vancanet. The issues which have been reported are related to perceived packet loss and noticeable performance degradation on voice and video calls. Mela-Group have been advised by Vancanet there is no issue in respect to configuration on the Vancanet ISP core network and PE-PE connectivity does not experience any packet loss when running extended ping tests. These two sites are the only locations where CE routers are unmanaged by Vancanet and still managed by the Fairbuy Housing IT network team, which has now TUPE'd across to Mela-Group IT team. No other major issues have been reported by staff located within the

regional offices and bandwidth utilisation does not appear to be over 50% at peak times for most sites.

Following the acquisition of Fairbuy Housing, plans around strategic growth and some internal IT governance discussions at board level, the Mela-Construction Group has tasked Mela-Residential regional directors to consolidate office space, where office locations 1 – 3 which currently operate out of Edinburgh, Dundee and Stirling (Scotland) will be relocated to a new state of the art single office location on the outskirts of Dundee.

The new office layout is shown below where a total of 300 users will occupy the new office and users will be relocated from office 1 – 3. Approximately 50 users will change their working arrangements to be home based as the organisation has recently relaxed policies on home working as it is viewed that it can make staff more productive, in addition to enhancing work / life balance.



The operating hours of the offices being relocated are 8am – 6pm where the offices are closed over the weekend.

Mela-Residential wish to re-use equipment where possible as despite several devices approaching the end of vendor support lifecycle there is not currently funds available in the main IT budget to refresh all equipment across all sites. There is some CAPEX budget available as part of the wider office move project budget where any equipment that will assist in eliminating risk of downtime can be purchased within reason. New equipment purchases should be kept to a minimum as a full refresh of the LAN estate is due in the next financial year.

Each site has a similar topology where a /19 RFC1918 range is allocated to each site where this range is split into multiple /24 and /25 subnets at each location then advertised as a single aggregate route into the MPLS L3VPN WAN using BGP. The layer 3 LAN subnet interfaces are hosted on the layer 3 switches in site 1 and 2 with the CE router hosting layer 3 gateways at site 3. Mela-Residential have avoided VLANs and subnets being stretched between different switch stacks in all sites.

Site 1 and site 2 have large chassis based core switches operating at layer 2/3 with a mixture of copper and fibre line cards to accommodate for user access and uplink fibre termination. It has been recommended by another external consultant that the chassis switch in site 1 is refreshed within the new office and replaced with a new dedicated core for fibre uplink termination. The chassis switch in site 2 will be moved but should be used for basic user access and all layer 3 connectivity should be moved to the new core fibre switch, where this includes default gateways and OSPF routing between the new WAN CE routers and core LAN switch in the new building. It is also a requirement that the subnets remain unchanged for the migration due to time constraints and avoidance of involving server teams to setup new DHCP scopes and amend firewall rules in the core DCs as this is viewed as over-complicating the design by the network team.

In respect to migration requirements from the business operations perspective, it is imperative there is no downtime during business hours and when reviewing the day rates for weekend engineering the regional directors have advised they wish to purchase 1 weekend (2 days Sat / Sun) engineering to perform any complex aspects of the migration if required and all other elements of users being moved to the new office should be performed in the evening after 6pm as the Mon – Fri day rate is less expensive even if this means moving users in batches.

Once all users have been migrated to the new office from each existing office location, the WAN links can be terminated at the old offices in line with the buildings being vacated.

**Question 1:** Given the information you have available; please advise which new equipment you would recommend that the network team in Mela Residential take to the board for CAPEX sign off in order to reduce risk and downtime on the implementation. Please note that all components listed will be redundant.

Location	Firewalls	Routers	L3 Switch	L2 Switch
Ground Floor Main Comms Room				
1 <sup>st</sup> Floor				
2 <sup>nd</sup> Floor				
3 <sup>rd</sup> Floor				

**Question 2:** Assume that there are four access layer switches with 48 ports each present in office 4 providing a total of 144 ports, with 3 switches on the third floor and one switch currently on the first floor, which sites would you recommend are moved first?

- a) Office 1
- b) Office 2 & 3 together
- c) Office 2
- d) Office 3
- e) Office 1 & 3 together
- f) Office 1 & 2 together



**Question 3:** Why did you pick this option?

[Free Text Answer or Discussion]

**From:** Customer

**To:** Consultant

**Subject:** RE: Migration plan

Hi Consultant,

Before we (Mela-Residential) agree to the new purchase of equipment the management team need to have confidence we have this migration in hand and wish to see a high level implementation plan as to how a block of users can be migrated. This migration plan should be a repeatable process and for completeness the WAN CE routers are in scope for the migration plan, although this should be discussed further with the service provider before being signed off.

We currently redistribute all OSPF learned routed from the core switches into BGP on the CE WAN router so when we add a new subnet it automatically propagates to the WAN and the service provider also told us to do some sort of aggregation in BGP I believe to advertise routes into the L3VPN.

We also figured that by deploying one new switch stack in the third floor of office 4, this will "free up" a switch stack in one of the existing offices 1 - 3 to move ahead of the next batch of users, so the idea is to implement the new switch stack in office 4, move the first batch of users which frees up a switch stack that can be relocated for the next batch of users and we are always 1 step ahead in respect to available equipment. This will reduce disruption if not eliminate it when we move users during the weekday change windows.

All users have laptops which they take home except receptionists who have a desktop PC. New IPT handsets will be deployed on all desks so we need to test the VLANs post 6pm ahead of the users turning up to the office the next day and hopefully they will just plug into their port then everything will be working as "normal".

Thanks

Customer

**Question 4:** Please organise the following migration steps into order where you should account for all equipment which is existing and new, being implemented at the new office.

- a) Order new WAN circuits for office 4
- b) Implement new WAN CE routers and physically connect to WAN circuit / BGP Peering
- c) Implement new core switch and connect to WAN CE routers
- d) Implement access layer switches in third floor and connect to new core switches
- e) Create VLANs on new core and access layer switches.
- f) Advertise specific /24 subnets being migrated in office 4 core switch's OSPF process
- g) Create then enable layer 3 virtual interface on new core switch in office 4
- h) Disable layer 3 virtual interface on legacy core switch in office 1 – 3 (relevant devices and subnets being moved only)
- i) Test connectivity end to end of migrated subnet
- j) Remove subnet and route advertisement configuration from office 1 - 3 core switches / gateway routers (relevant devices and subnets being moved only).
- k) Connect user devices to new access layer switches in office 4
- l) Decommission old equipment and circuit at legacy offices 1 - 3