

MANAGING CONNECTIVITY ACROSS MULTI-SITE ENTERPRISES

SQUARE MILE SYSTEMS



Managing Connectivity Across Multi-Site Enterprises

When it comes to the management of the physical infrastructure, for many it's where to start and what is the scope? Mapping connectivity helps understand the end to end paths of devices, the logical connections and the overall network configurations. It can cover cabling, networks, equipment, VLANs, firewalls, etc.

There is always an organisational history of how IT management operates and works with limited resources, which often results in evolving and sometimes conflicting approaches to managing connectivity. Often losing control over time.

Once you lose control, you can expect to:

- Increase the costs of change activities
- Increase the effort required to deliver a project
- Delay planned installations, migrations and decommissions
- Repeat site surveys and audits for understanding devices connections
- Require more time to reverse engineer and de-risk complex projects
- Duplicate information sets in many formats across multiple teams

Resolving a lack of connectivity understanding requires site surveys for each project, interfering with any attempt to streamline change processes and delays in planning. The answer is to efficiently link information, processes and people together so changes are smooth and easy to undertake. Common sense really...



Common Challenges For Connectivity Management

1. Evolved infrastructure

IT environments are often a mix of planned and evolved infrastructure built up over many years. Creating a Pandora's box of methods and inconsistencies which only come to light when you look at naming, labelling and existing documentation.

2. Mix of experience and understanding within teams

Technology changes but so do people. It is vital to keep things simple and easy for connectivity to be managed as teams restructure and knowledge is lost.

3. Changes made by others without communication

Some quick equipment installations, cabling or allocating ports just seem to happen, avoiding informal or formal change processes. If an IT team finds their environment has changed from what they believed, it undermines planning effort and reduces confidence in any build or capacity documentation.

4. Being able to separate planning, implementation and capacity roles

Centralised planning of implementations requires local knowledge to be made available. It makes sense to use local support and service teams or partners, but it requires common understanding, language and documentation of what they will come across.

5. Lack of a baseline to underpin improved planning and change processes

Having trusted connectivity data to underpin processes requires a starting baseline – which could be a room, a technology, a building or everything. Setting standards while data is captured often doesn't deliver a consistent baseline.

6. Knowledge spread across individuals, toolsets and repositories (mobiles)

Existing connectivity understanding is often a mix of history, experience and a multitude of data sets. Bringing it all together isn't easy as it involves change as much as common data.

7. Lack of time to plan

Running from one support ticket to the next and putting fires out means there is often little time to work efficiently or use support tools. External resource may be needed to help deliver improved processes and support toolsets,

Not addressing these challenges results in changes taking longer, costing more and planning is often only partial. All it needs is better management!



The Impact On Staff And Stakeholders

Connectivity affects many job roles across the organisation, so you can easily identify where infrastructure knowledge is lacking. Any of the following points sound familiar?

- Engineers being called in at all hours to help troubleshoot errors occurring overnight.

- Changes are made without forward thinking compromising best practice. For example.

- *No labelling, wrong patch cord lengths, bad cable routing*
- *Equipment installed wrong way round for cooling*
- *Cabling spaghetti*



- Site surveys are done for every change as nothing is trusted. Holding up works and personnel as the unexpected is always expected.
- Projects often delayed, as managers are often escalating and changing priorities.
- Extra contract staff are taken on to cope with increased workload, but don't know the organisational methods, introducing inconsistencies to be cleaned up.
- Having to reverse engineer through quarterly audits, gathering capacity data which is separate to the existing connectivity records.
- Switch ports, space, SPOF, backbone fibre usage, power are not allocated efficiently as decommissions are not completed. Leading to a lot of wasted engineering time and purchases, as finding information is too much effort.

There are currently no dedicated standards for managing connectivity.

Technical standards exist for the building, designing and commissioning of connectivity such as TIA-606. But once installed, no standards cover the management of connectivity, so each organisation needs to define its own policies, methods, processes and information sets. Many don't. So individuals and siloed teams do their best.

Managing Different Connection Types

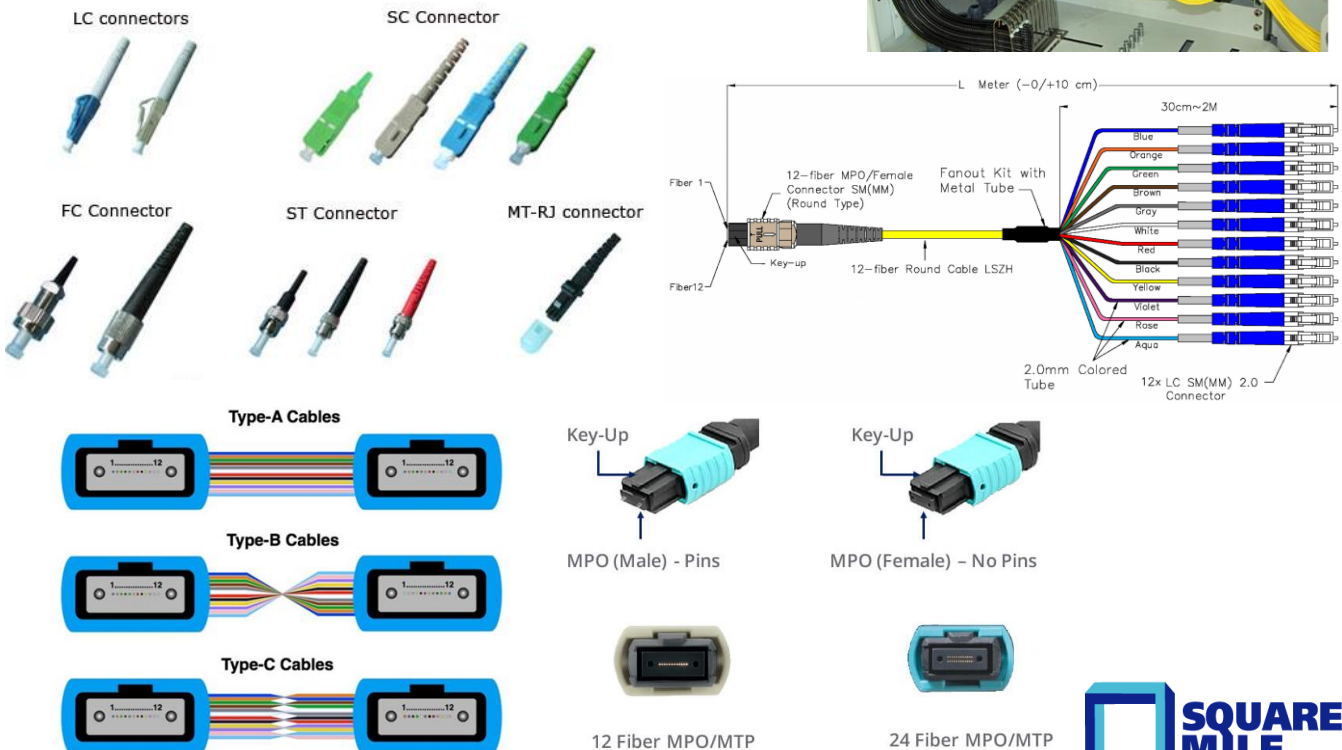
When equipment is installed it looks good on installation, but it doesn't take long for time and reality to set in. As time passes and new projects make changes, you could end up with the cabling spaghetti you can see on the diagram to the right.



With connectivity we also have to understand the variety of port connections. The level of detail to manage connectivity extends beyond typical inventory and asset solutions.

We need to know what type of connectors they have, what orientations are they, do they breakout into multi-cables? What SFP modules are being used, do we have spares of that type? Cable fibre counts and density continue to increase, making changes more complex to deliver.

Connectivity information needs to be known without relying on site surveys. Improved management needs focus, skills and the use of specialist toolsets such as AssetGen Connect



Multiple Types Of Physical Connectivity

Which types of connectivity need to be managed?

WAN Circuits



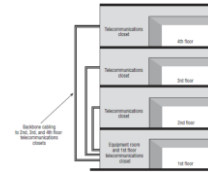
Circuit references
Termination points
Power

Campus / Metro



Ducts
Blown fibre
Power
Wi-Fi networks

Backbone



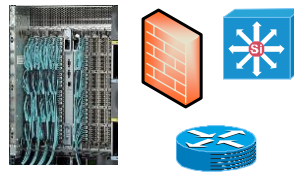
Fibre / Copper
Blown fibre
Cable tray
Power

Building



Data Centres
Equipment Rooms
Plant rooms
Cabinets
Offices
Power

Active Devices



LAN/SAN/Wi-Fi
Power / UPS
Security cameras
IoT sensors
Digital signage

User Areas



PCs, printers
Fibre / Copper
Cable tray
Data outlets
Power Distribution

Covering multiple sites often results in a variety of different connection types to document. Typically, most organisations start with the core infrastructure, then extend to the edge with a phased approach.

As more areas come into the connectivity management scope, it gets easier to understand the big picture. IT systems, user devices, digital signage, IoT, security and other network types typically use the same shared infrastructure. As multiple technologies and teams are involved, connectivity management is always complex.

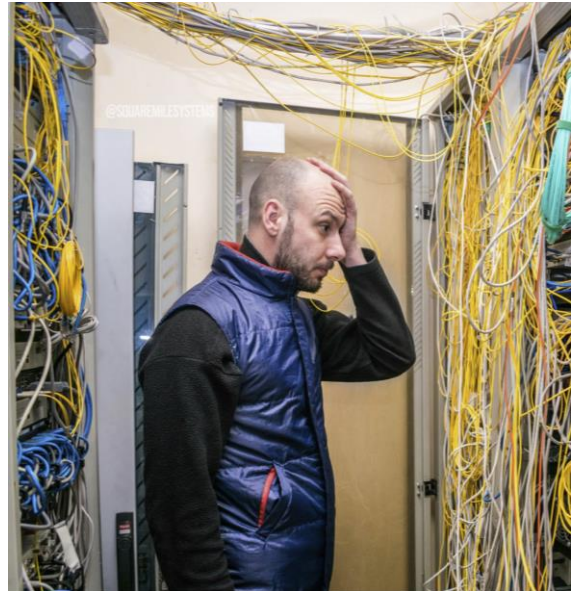
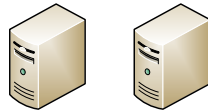
Governance and control of IT infrastructure continues to be a worry for many organisations, with increasing requests to see evidence of network control. As an example, in the USA, new cyber security legislation means that federal environments should remove unused or unauthorised connections. Not easy without having a maintained list of all devices and connections to work from.

A Simple Example

A Simple Request – We need to install and connect 2 servers?

These 2 servers need to be installed and will need connectivity for the following;

- LAN
- SAN
- ILO / MGMT
- Power



But there is just one small complication. The servers go in the rack on the right, but all the switches are in the rack on the left. Where do you put the servers. There are live cables blocking access to the only space free for the servers. How do you connect them? How much detail should be in the work instructions so they don't need supervision?

We would know which switch ports are available in the other rack if a previous project had removed unused cables. More work than expected due to lack of decommissioning!

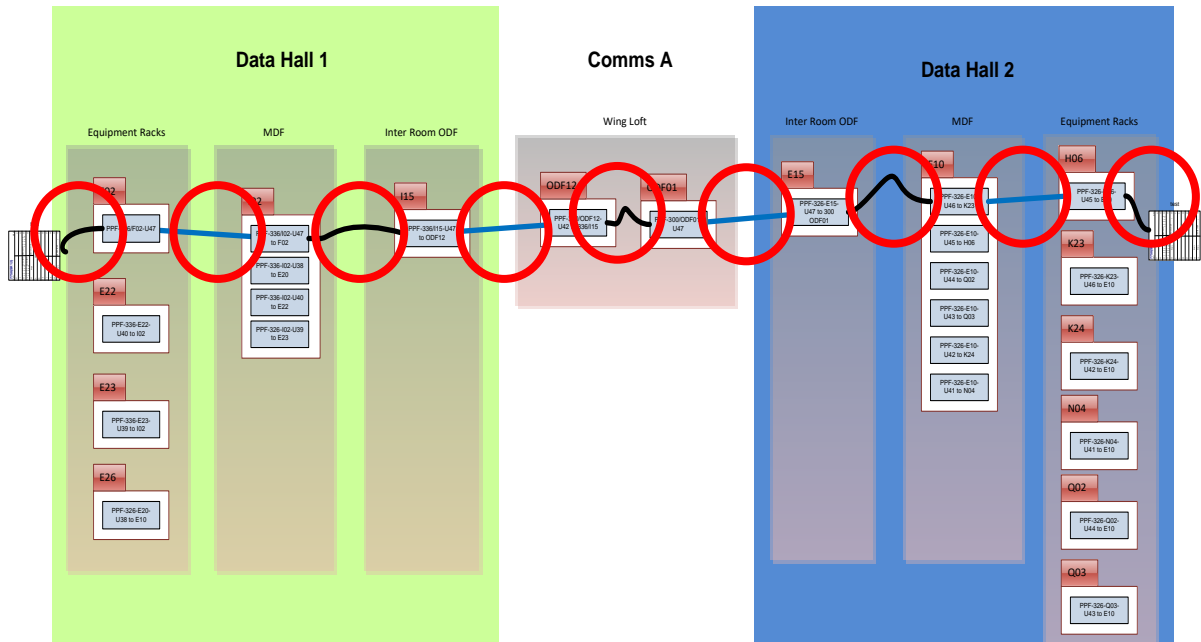
A common approach is to use a spreadsheet to record end to end connections, though it may get difficult to decide on what detail is needed for a multi-site environment. An end to end path for one connection could have the data fields you see below and more...

Server		Patch Panel			Patch Panel			Switch		
Device	Port	Patch	PPA Port	Patch Panel A	Back to Back	Patch Panel B	PPB Port	Patch	Port	Device
UK_BIRM_UX01	A	23	05	AA		AC	05		NIC 1	SIW-BHAM-01
Room Rack Position Make Model Asset Number IP Address	Port Type Speed VLAN	Colour Cable Label Type Length	Port Type Speed	Room Rack Position Make Model	Type Length	Room Rack Position Make Model	Port Type Speed	Colour Cable Label Type Length	Port Type Speed VLAN	Room Rack Position Make Model Asset Number IP Address

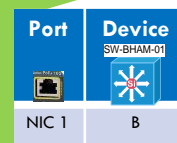
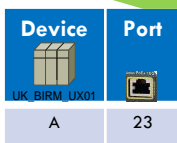
And once the installation is complete the spaghetti cabling is still there. So validating the connections list isn't easy.

In A Larger Environment – A Bigger Spreadsheet

In larger environments with multiple buildings and rooms, the end to end connection path can't easily be understood without creating a diagram to help explain. Troubleshooting and testing is more difficult as more wires are involved.



Connectivity detail is often added to with work request references, dates, assigned engineers, etc. to provide a change history. No wonder the spreadsheets get larger and the manual data entry often creates mistakes. Having localised spreadsheets for each site makes sense, but becomes a nightmare to manage for consistency and conventions. Connectivity data is complex, requiring a lot of manual effort where there are multiple hops.



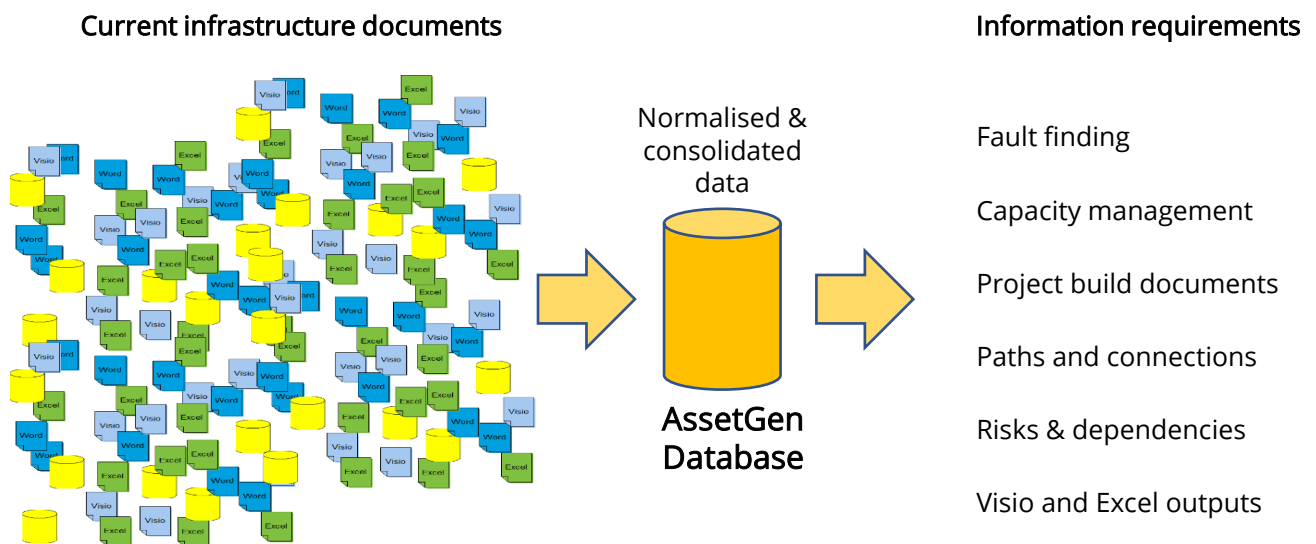
Room Rack Position Make Model	Port Speed VLAN	Type Cable Type	Colour Label Length	Port Speed	Type Cable Type	Room Rack Position Make Model	Type Length	Room Rack Position Make Model	Port Speed	Colour Label Length	Port Speed VLAN	Room Rack Position Make Model
Asset Number	Contact	Request date	Request Number	Project Code / Ref	Work number	Scheduled date	Installed status	Path length	Asset Number	IP Address		



Efficient Documentation – The AssetGen Approach

To make it simpler to understand and manage connectivity, the AssetGen approach is to consolidate buildings, inventory and connectivity data into one AssetGen Connect database. This gives many benefits from a user and a management perspective.

- Its easier for users to create, maintain and consume connectivity information
- Duplication is minimised, backup is simple and all changes have an audit trail.
- Scales to cover all technologies, connection types and size of infrastructure.
- Enables current, allocated and spare capacity to be managed in the same system
- Visio automation options includes network, power and other types of connectivity diagrams as well as floor, rack and architectures.
- Supports complex equipment with cards, modules, ODF cassettes, etc.



AssetGen for project and operations connectivity needs.

The AssetGen system is available as a single user desktop version and a multi-user server version with web browser interface. Licences can be purchased or rented depending on project or operations deployment.

For example. A systems integrator may have multiple customers and projects of different scope. So rented licences enable data capture, planning and production of handover documents for each project. A small team may only need a desktop version, while a multi-user system may be required for a larger project.

Connectivity Management Summary

Many use Excel, Visio and other software to support management of ICT infrastructure connectivity, but find they need a more efficient solution for all the reasons covered in this paper. If the connectivity information available isn't trusted or presented well, then engineers will continue to do site surveys, re-trace cables and projects will be delayed until the right information is gathered.

Without an infrastructure database like AssetGen any process improvements or baseline audits will be undermined by staff still having to update multiple documents with each change. AssetGen integration with MS Visio is a game changer in reducing admin workload on very busy IT teams.

Connectivity management is getting more difficult with increasing density of connections and changes in working methods. With centralised working preferred by both employer and employees there has to be better documentation. It prevents the need for local site surveys, as well as supports remote diagnosis of potential faults. Once control of connectivity is lost, then the cost and pain of regaining control can be considerable. SMS can help with implementation and support services as needed for AssetGen implementation.

We have developed AssetGen to be very flexible and straight forward to use, so why not try out its connectivity management features yourself?



About Square Mile Systems

Square Mile Systems is based in the United Kingdom, developing the AssetGen system at our HQ in Poulton, Gloucestershire. The first production version of AssetGen was released in 2006 with customers across all sectors and continents then purchasing the system. While mainly focused on complex enterprise level ICT systems documentation, AssetGen is also used for marine, industrial, military and transportation applications that have adopted IT and IoT technologies.

Square Mile Systems works with various industry trade associations in the UK and North America developing best practices and standards for documenting and visualising complex ICT infrastructure.

‘ We use AssetGen constantly and trust it more than our CMDB and spreadsheets. (and neither produces rack and network diagrams!) ’

For more information, please visit our websites for product information, webinars and contact request forms.

Alternatively, call us at our HQ and we will be glad to help.
Tel: +44 (0) 1285 852190



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