The Cost and Management Benefits of Documenting Infrastructure Connectivity

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Control over the physical connectivity of networks, power and storage is critical for planning changes, maximising the uptime of servers and reducing troubleshooting times. With the introduction of high density blade systems and network switches, it has never been so important to make sure that infrastructure connectivity is well documented and managed. AssetGen Connect and AssetGen Planner reduce the workload of technical teams in implementing connectivity, also improving capacity and change management.

The Problem

Every change in connectivity has a cost. In addition, any uncertainty in how IT systems are connected often results in the tracing of connections – because records (if they exist) aren't trusted. Experienced IT professionals still spend time reverse engineering existing environments because of gaps in information sets and team processes, even though we have had to connect systems with wires for many years. Newer technologies just make it worse!

With the increasing density and complexity of modern 1U servers and blade environments, as shown on the right, it's even more difficult to understand network, SAN and power connectivity within a data centre. On top of this are the management information needs such as capacity reporting, risk assessments, change records and audit trails which also add to technical staff workload. Improving the documentation of the existing physical infrastructure should be a quick way to increase team productivity and reduce project workload, but in practice many find it increases the number of spreadsheets and other documents to the point where it becomes unworkable.

		BEFORE	AFTER
No. of Servers per cabinet		3-6	30-40
Power Disipated per cab.		300-2000W	3kW - 25kW
Current service to cabinet		16A	32 A or 3 phase
Types of Equipment		Servers Monitor KVMs Power Strips UPS	Blade Servers Power Distribution Units MidSpan Boxes Disk Arrays (Storage) Smart Power Strips Regular Power Strips
Network types		100Base-T	1G, 10G, SAN
No. of Cables (per server)	**Power**	1 or 2	2 to 6
	Network	1 or 2	5 to 10
	Total	20-30	300 - 400

Doing nothing results in increasing risks, as there is less time to reverse engineer, plus any attempt at raising documentation standards are compromised by short term fixes. It needs a better way - preferably one that costs less than the current state.

The Cost Savings by Improved Management of Infrastructure Resources

If you could get an extra 10% more kit into the same data centre, then it could extend the life by another year or two, saving on refurbishment or renting external space. Why buy more racks or network switches if you can optimise the existing capacity? Another good practice is to move power-hungry servers to particular racks to help balance power phases, thus reducing circuit breaker and PDU loading. However, much of the existing infrastructure has evolved over time, and often the documentation doesn't exist to make it easy to plan. Getting the data involves an audit which increases workload, negating the cost benefits you were looking for. Optimisation will then probably mean moving kit, but that costs as well.

It's a missed opportunity most organisations live with daily. Saving on major capital costs is possible if you optimise the use of existing infrastructure, but it means you need to constantly know existing capacity and usage as part of infrastructure management.

Improving Productivity of Staff or Partner Organisations.

There are even greater savings to be had by adopting improved processes, which reduce the cost of changes, whether they are for projects or operational needs. If you were to discuss internally the time needed to carry out the following tasks it might be surprising. Many tasks are not visible or easily quantifiable, just part of the daily mix of activities which keep teams busy. If you could achieve a saving of 10%-50% on existing tasks, this could equate to having an extra team suddenly available. If this sounds unrealistic, try working out how much time is spent identifying, tracing and communicating connectivity today. In some cases they aren't carried out at all as the documentation doesn't exist to make them feasible or coherent. How much time does the organisation spend on the following tasks? Should it be less or more than present?

- Site surveys to gather or verify information for planning tasks
- Creating project plans, deployment plans and build instructions
- Updating operational documentation to reserve capacity
- Updating operational documentation after changes have been implemented
- Producing and verifying LAN, SAN and power diagrams
- Identifying optimisation or consolidation opportunities as a result of policy changes
- Attending meetings and communicating change activities
- Tracing connectivity as part of troubleshooting, or identifying spare ports
- Producing and communicating capacity reports of power, network port usage, space, etc
- Producing management reports on change activities – installs, moves, decommissions, etc

A key problem with managing connectivity is that it often involves a physical visit. The use of standard MS Office tools is how most start to implement some control, but even in a small environment it becomes difficult to maintain. But why is this so common?

Why Can't We Manage Connectivity With Just Excel and Visio?

When we need to understand connectivity the normal approach is to use desktop tools such as Excel, Access and Visio. It's quick and easy to develop what you need as an individual, with sharing a simple case of emailing, or storing on a network drive. Unfortunately, it is also difficult to replicate the manual decisions and update processes across colleagues or teams. For instance, updating multiple spreadsheets and diagrams with new network switch connections will be carried out differently depending on the level of understanding. Another example is that no two Visio diagrams will be the same, as a picture will always present what the author wants to communicate. The following types of information are typically required for managing connectivity. It doesn't matter if it is network, power, copper, fibre, etc. as a server can be connected to all of them.

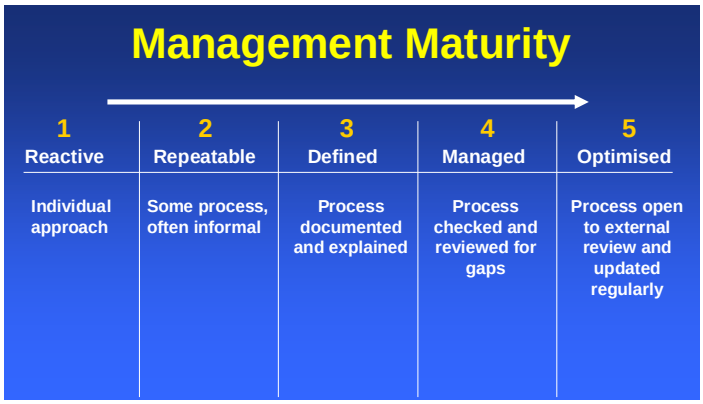
1. The end points of a cable and any labels (e.g. server port to patch panel)
2. The path between two end points (e.g. server port connected to switch port)
3. All the paths and end points to any device (e.g. everything connected to a network switch)
4. The types of ports on devices or patch panels (connector types, speed, settings)
5. Addressing information to aid understanding (cable labels, colour, VLAN, IP address)
6. Diagrams of all the above to show physical paths and routes (path and route diagrams)
7. Diagrams of multiple devices of the same type and interconnections (network diagram)
8. Diagrams of multiple devices of different types and their connections (power topology)
9. Diagrams of physical locations of components and ports (floor, rack, device, chassis build)
10. Port capacity reports of fixed infrastructure and devices (patch panels, PDUs, LAN/SAN)
11. Reservation of ports for project plans (pre-allocation of switch ports)
12. An audit trail of changes to devices, connections, cable labels, etc.
13. Production of build instructions for connecting devices for other teams / 3rd parties etc.
14. Management reports on numbers of installs, moves, changes, decommissions, etc.

This list looks daunting – it is! It also shows that connectivity management requires different views which are satisfied by lists, pictures and reports with differing levels of detail. It's easy to see why the numbers of spreadsheets expand and why the addition of a switch or server can result in updates to lots of different files. Look at how many times a switch name appears in existing documentation and don't be surprised if you find more than 100 instances!

It's also easy to see why many are not accurate, trusted or suitable for multiple needs as the level of detail of a diagram or spreadsheet needs to be appropriate. The end result is that IT staff audit and site survey (generating more documentation!) for each change. The potential for cost saving and workload reduction is very significant, but unlikely to realised if standard office applications are used. Attempting to resolve the documentation problem by a coordinated approach is often met with scepticism by colleagues – it's not their problem. Why should we bother to keep any records up to date, why not just hire more people or contractors to cope with changes? Why not buy a new data centre because it's too difficult to understand the existing one? Which is what happens…and why the opportunity for cost savings and improvement often exist, just waiting to be addressed.

Managing the Connectivity Problem?

If you have all the resources you might need, can deliver the speed of change required of the infrastructure, are happy with the time taken to fix problems and can live with occasional outages and project delays caused by misunderstandings then there is no problem! Don't be surprised when another department or a supplier offers to run the same service for half the price – because they can! In any organisation that prides itself on the quality of management and controls – it is wise not to wait until someone notices that it could be better.



The chart on the right is useful to explain the differences in culture and approach between styles of management. To move from **Reactive** to **Repeatable** requires common methods to be adopted, often within small teams. It is difficult to do if there isn't common knowledge sets, as a task will be carried out using an individual's own understanding.

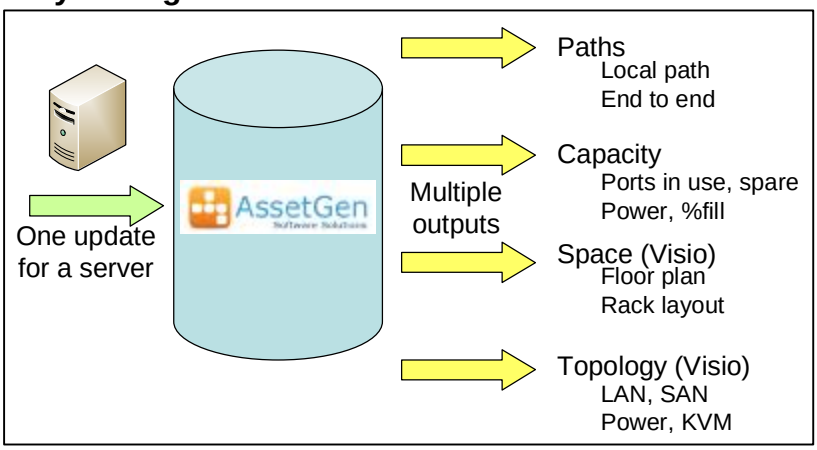
The **Defined** category requires a process or workflow to be documented and explained to all – not easy to do if reliance depends on local infrastructure knowledge. It's at this point that many realise they don't have the supporting information systems, often creating a workflow in a spreadsheet or local database. Managing user desk adds/moves/changes for example is easier if you log all requests in a single system. The **Managed** phase is when there is verification that requests are logged and processes are being followed, plus the processes adapt with changes in needs. The **Optimised** stage is reached when the organisation feels that an external review can help get additional improvement.

Development of infrastructure management processes can be held back by failure to address the connectivity challenge. At a low level it means that connections have to be traced each time, at a higher level it means that it is difficult to manage capacity and risk. It isn't a surprise that a common aspect of well managed environments is that they already address connectivity management – and they still look for better ways!

To realise the potential cost savings by optimising hardware and people resources is a responsibility of IT management, requiring focus on process, people and supporting systems. We'll now cover how AssetGen products help to create and maintain the infrastructure documentation needed.

The AssetGen Approach to Connectivity Management

The AssetGen approach defines all equipment, ports and connectivity in a common format. It doesn't matter what technology or type connectivity you want to manage - power, LAN, SAN, WAN, KVM, serial etc. the format is the same.



Based on a powerful SQL Server database with web access, AssetGen Connect provides the path tracing, capacity reports, audit trails and workflow that Excel can't easily do.

For example

1. When a new server is placed in a rack in AssetGen (or planned as a future task)
    a. Inventory and audit trail is updated
    b. Rack diagrams are updated
    c. Capacity reports for space and cabinet power are updated
2. When the server network, power, SAN and KVM connections are created
    a. Local connectivity is updated to patch panels and devices
    b. End to end paths are summarised with each hop and cable labels
    c. Port capacity on switches and patch panels is reserved and updated
    d. Network, SAN, Power and other topology diagrams can be generated / updated to suit project and operational needs
    e. Detailed build instructions are available for installation team(s)

So a task that takes 4-5 few minutes in AssetGen saves a lot of time compared to using MS office equivalents. Even more time is saved when trying to validate that **all** relevant existing information sets have been updated as a result of a change – almost impossible using multiple Excel and Visio files. So less work, more output – a good approach as it saves valuable engineering time!

There are product data sheets, frequently asked questions (FAQs) and additional white papers on the AssetGen web site with more detail on capability and benefits. Even better, ask for an online demo so you can see how AssetGen can help reduce staff workload and directly reduce costs.

To Finish With

This white paper has focused on the cost and management issues in controlling connectivity, highlighting areas where financial and task savings can be achieved. In the short-term AssetGen solutions will enable you to identify where cost and management benefits can easily be realised by improving the quality of infrastructure documentation. Longer term, the AssetGen range can help overcome practical information management challenges, ensuring technical teams don't drown in spreadsheets as organisations develop more mature management processes and disciplines.

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