

Managing Multi-site, Multi-Technology Connectivity

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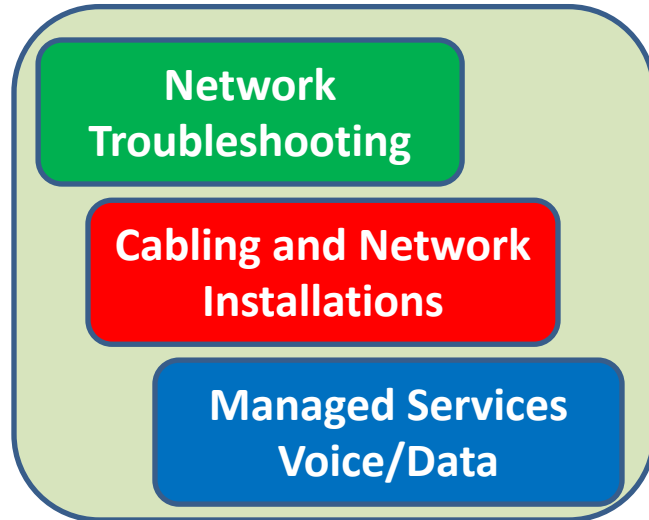
My Objectives

Help you understand techniques and practices that make managing connectivity easier across multiple locations

- Universities
- Hospitals
- Commercial & Finance
- Government offices
- Transportation (Airports, Ports, Railways)
- Pharmaceuticals, Chemical & Industrial Plants
- Military sites

Personal Background

Personal Experience



Skills
Awareness
Communication

Naming
Labelling
Change Process

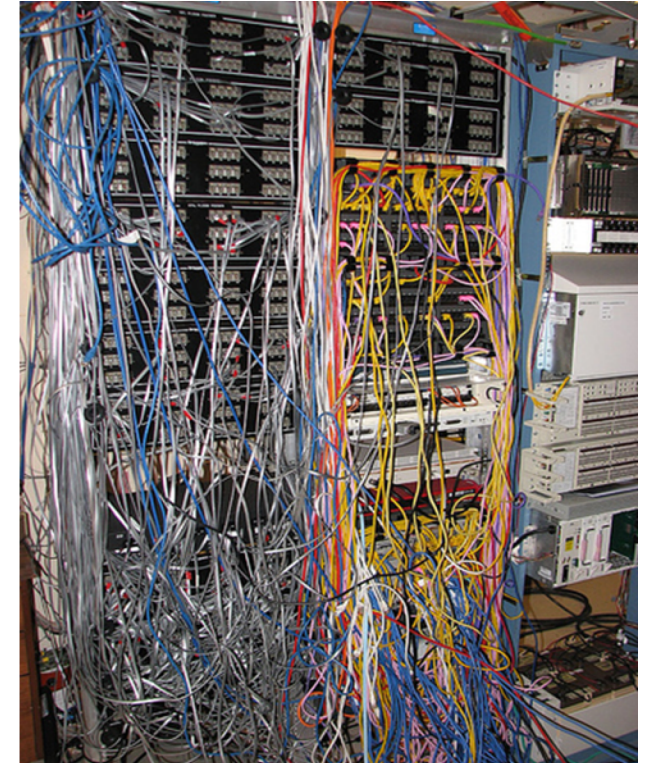
Baselining
Toolsets
Visio automation

Industry Groups and Frameworks



Why Manage Connectivity?

- Increase in project costs and delays
 - Reverse engineering with workshops, site surveys, etc
 - Overloading of key engineers / individuals
- Increased risks
 - The “human factor” (guess, assume, worry, forget, etc.)
 - Huge security holes
- Transformation activities are costly
 - Upgrading networks, consolidation, cloud migration

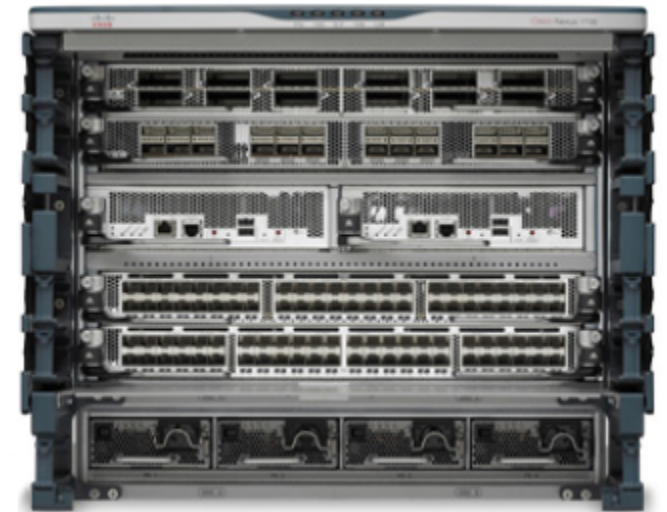


Physical connectivity data highlights the current understanding of inventory and dependency.

An easy target for auditors!

Overview

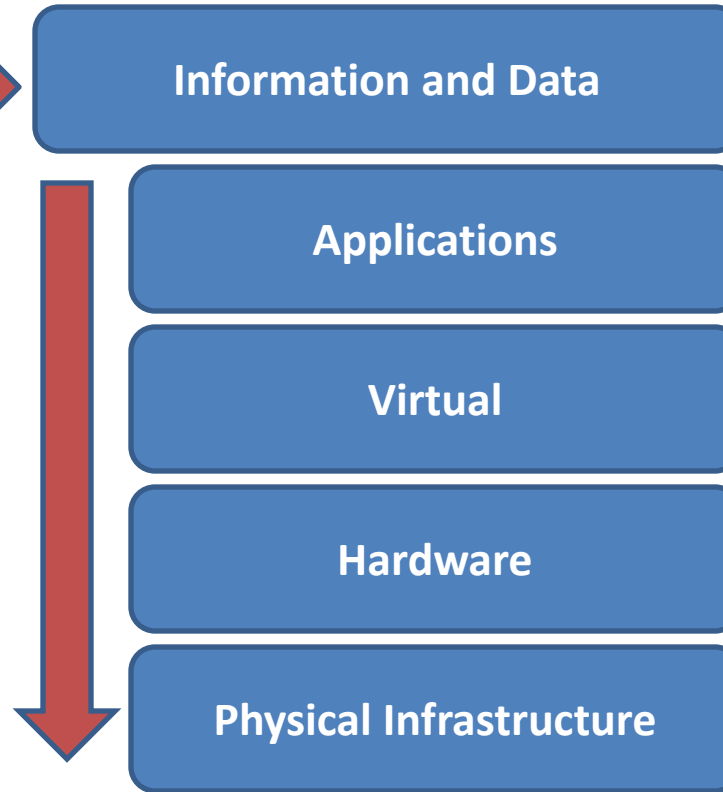
- Understand the Problem(s)
- Standards can help – or hinder
- New technology challenges
- Organisational challenges
- Labelling – not the same as naming
- Case Study(s)



A Starting Point?

1. Is every device in data center / equipment rooms and how it is connected currently documented in a common system that supports connectivity for both planning and operations needs?
 - data, power, video, voice, building management, CCTV
2. Are change updates to inventory and connectivity data duplicated in spreadsheets, diagrams and databases in a consistent way?
 - When devices are added / changed / removed
 - With changes in backbone cabling or patching
3. Can you create detailed work packages for connectivity changes for internal or external engineers, without visiting site beforehand, or being there during changes?
4. Does current connectivity documentation for data centers and shared equipment rooms use consistent naming conventions across all locations, devices and connections?

Information Requirements Force Technical Change



Infrastructure responds to change so there are limits to what you can manage

How Do We Cope?

- Adopt industry best practices – where they exist
- Ensure operational processes are not the weakest link
 - Ensure clarity on roles and practices
- Make the complexity easier to manage
 - Clear naming, labelling and documentation
 - Reduce the number of data sets needed for governance and control



Case Study One

Two data centers (co-lo)

- approx 400 racks
- 36200 fiber/copper connections
- 5800 patches
- 600 servers



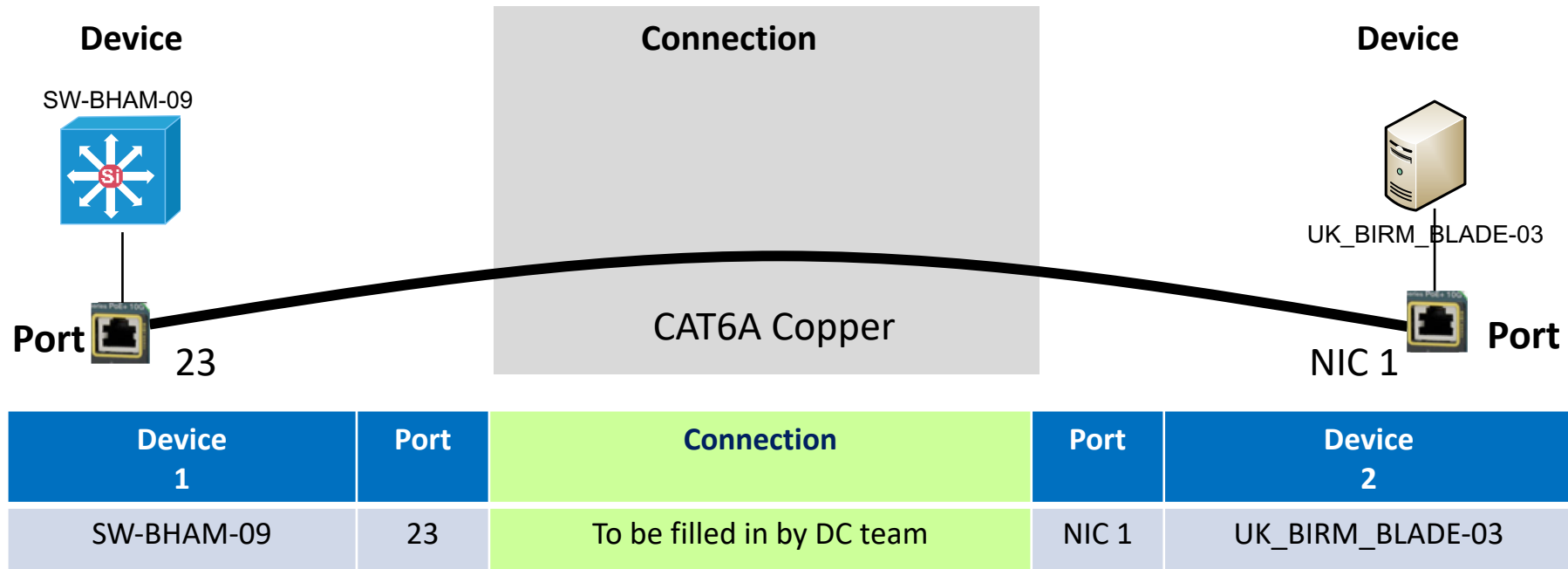
“I’m just overloaded and can’t get others to understand

4 spreadsheets – inventory + connectivity per DC

(>1.8 million cells) + >6000 other spreadsheets

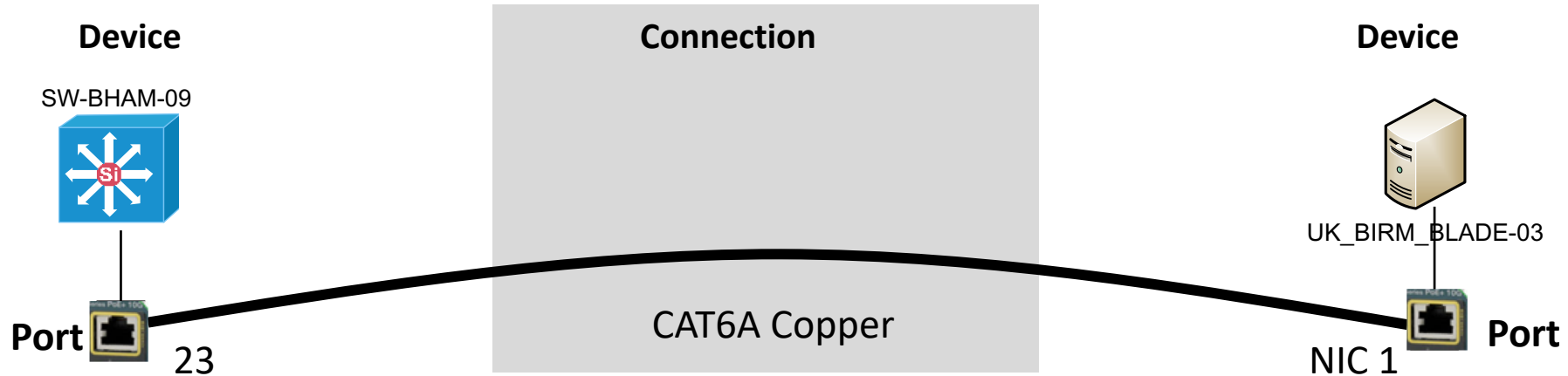
Maintained by a data center manager – no onsite staff

Requesting a Connection -1



This is the initial spreadsheet used to capture connectivity requests

Requesting a Connection -2



Device 1	Port	Connection	Port	Device 2
SW-BHAM-09	23	To be filled in by DC team	NIC 1	UK_BIRM_BLADE-03
Room	Port Type	Colour	Port Type	Room
Rack	Speed	Cable Label	Speed	Rack
Position	VLAN	Connection type	VLAN	Position
Make		Length		Make
Model				Model
Asset Number				Asset Number
IP Address				IP Address

The spreadsheet just went from 4 to 30 columns wide!

Naming & Labelling

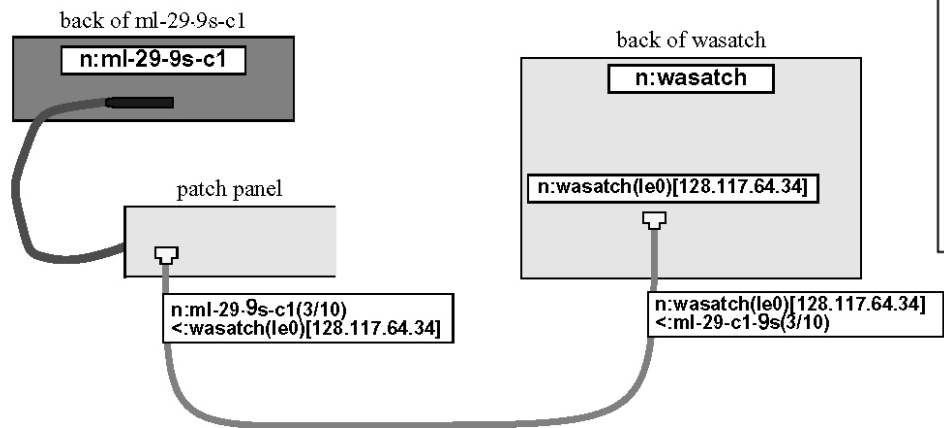
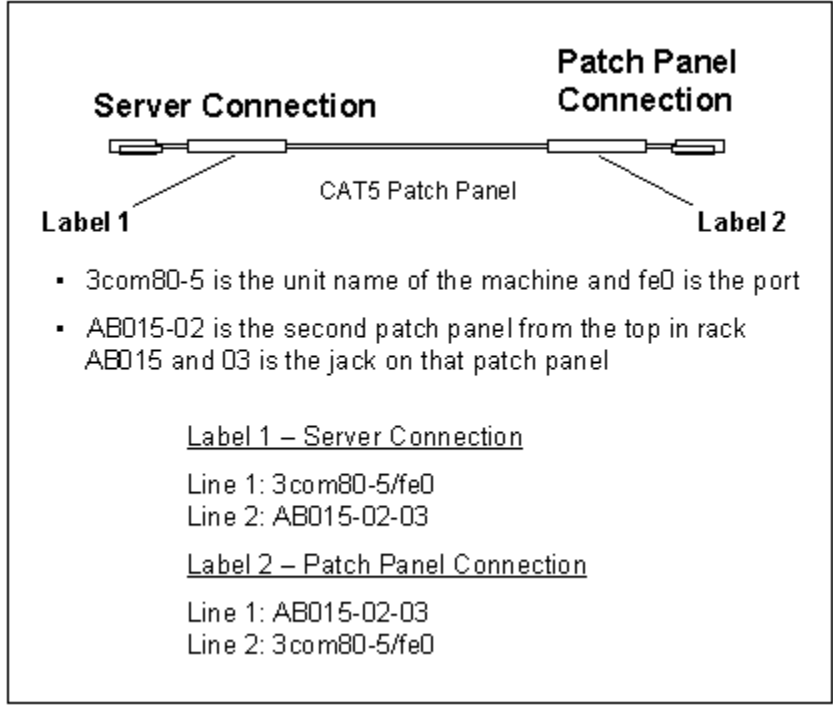
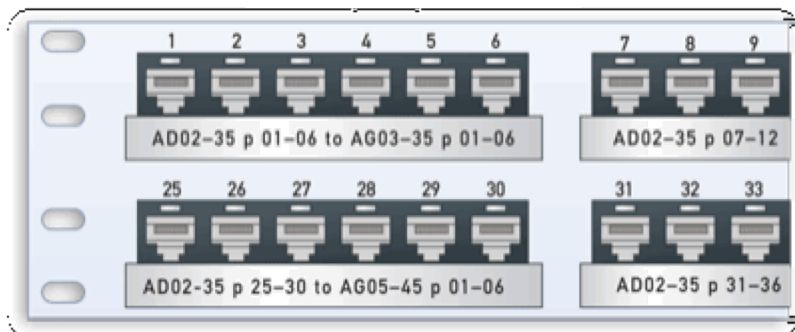


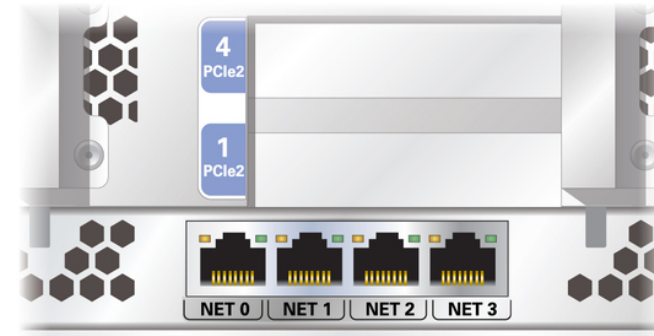
Figure 5.2 Sample name labels

Ports and Connections

Equipment – use the physical label?

Port name

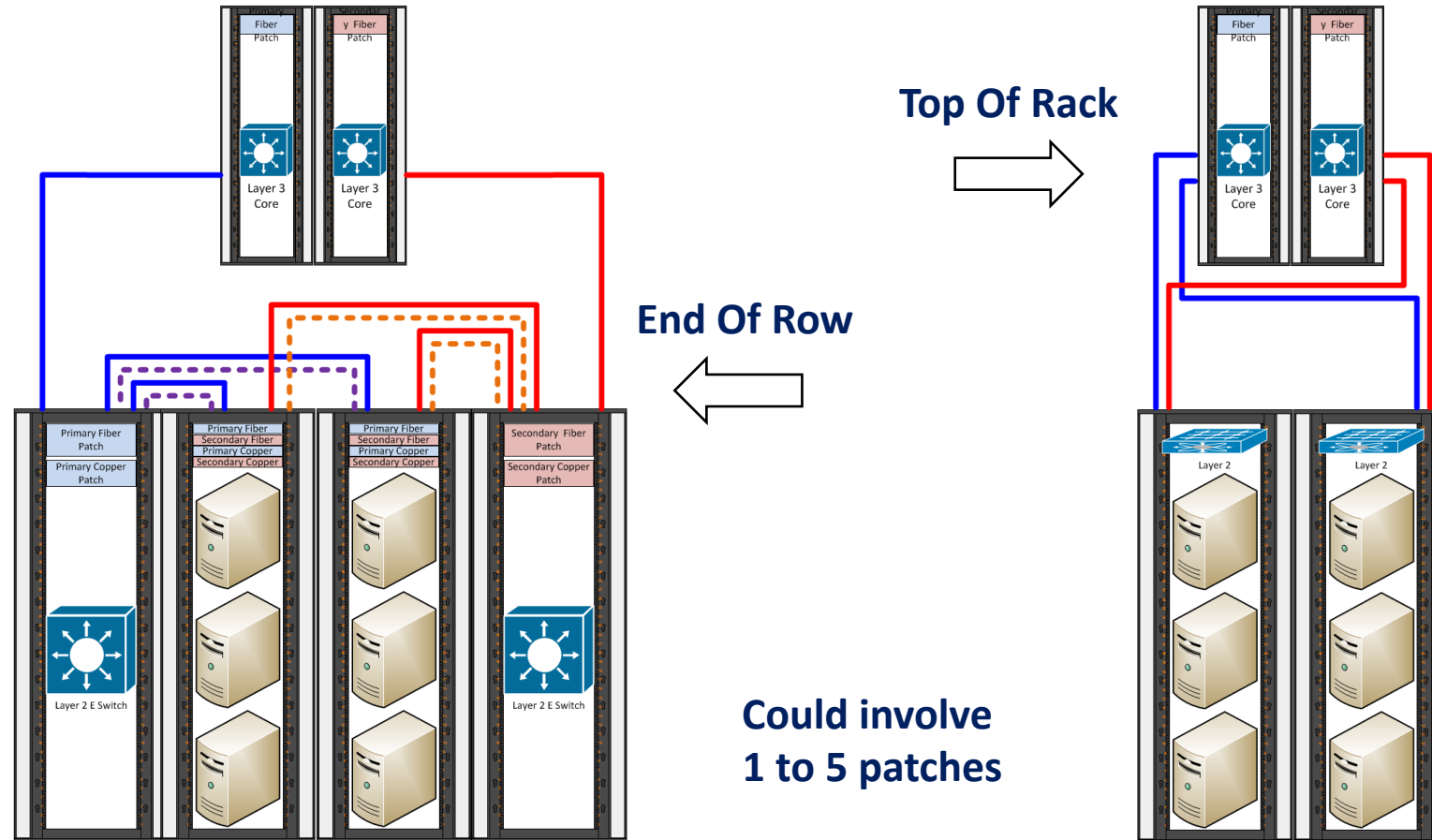
- 1 or 01 or 001?
- 2/1 2\1 2/01 SL2/1 Port 2/1 Gig 2/1 Fe2/1 Slot 2/09
- Mgmt MGT Con Console ILO Net Mgmt
- NIC 1 Eth A Net 0 hba0 bge1 12F1 primary



Cable Labels

- | | | |
|--------------|--------------------|-------------------|
| 1) port | 2) local devices | 3) end devices |
| 4) full path | 5) cable unique id | 6) path unique ID |

And – Which Cabling Topology?



End Of Row

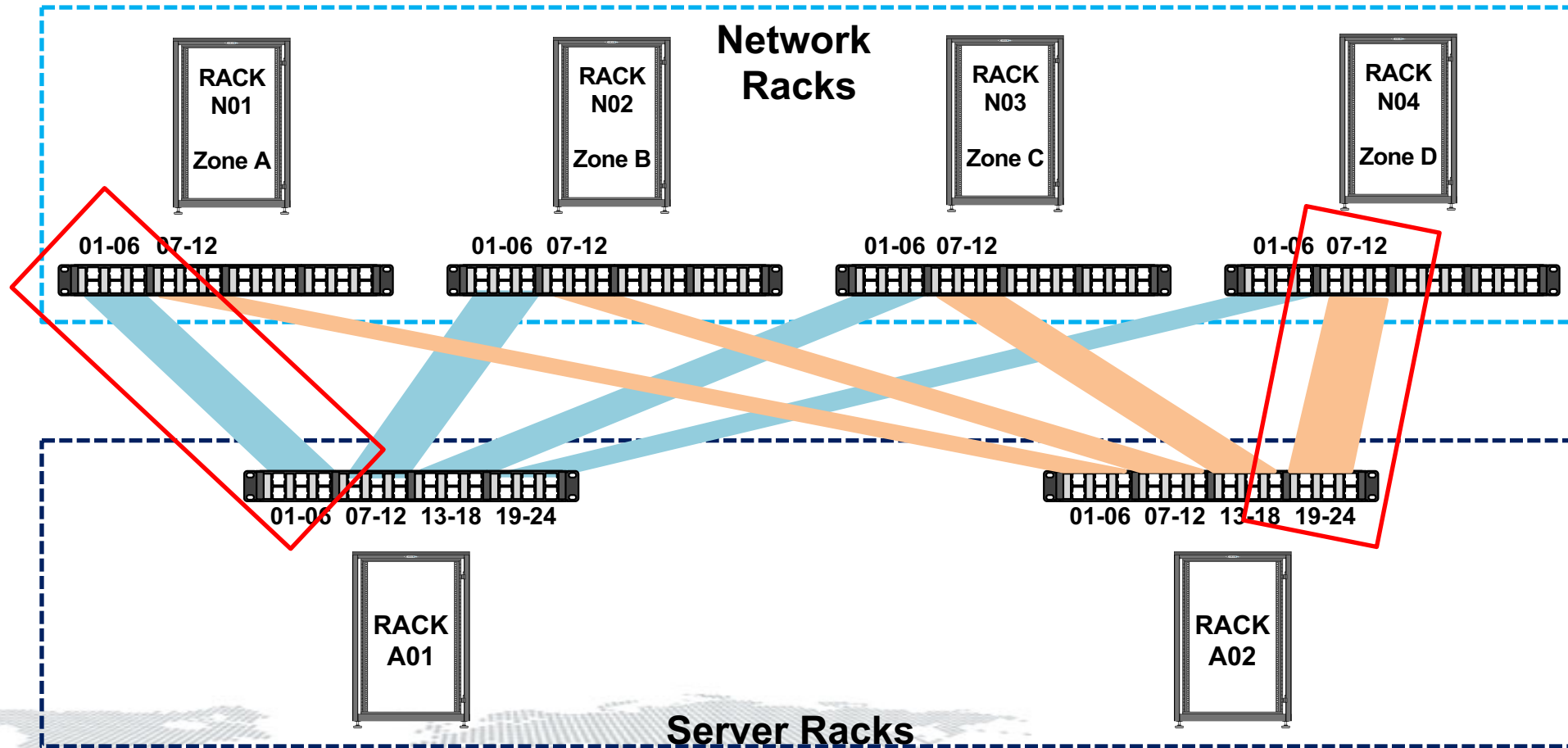
Top Of Rack

Could involve
1 to 5 patches

— Primary LAN Fiber —
— Secondary LAN Fiber —
- - - Primary LAN Copper - - -
- - - Secondary LAN Copper - - -

— Primary LAN Fiber —
— Secondary LAN Fiber —

Multi-path Options



Very Multi-path – Modular Panels



One unit = 48 modules @ 6 LC ports per module = 288 ports

One rack @ 6 Units = 288 modules = 1728 ports

Increase The Spreadsheet Size – Add Control

Device  UK_BIRM_UX01	Port 	Patch	PPA Port 	Patch Panel A	Back to Back	Patch Panel B	PPB Port 	Patch	Port 	Device SW-BHAM-01 
A	23		05	AA		AC	05		NIC 1	B

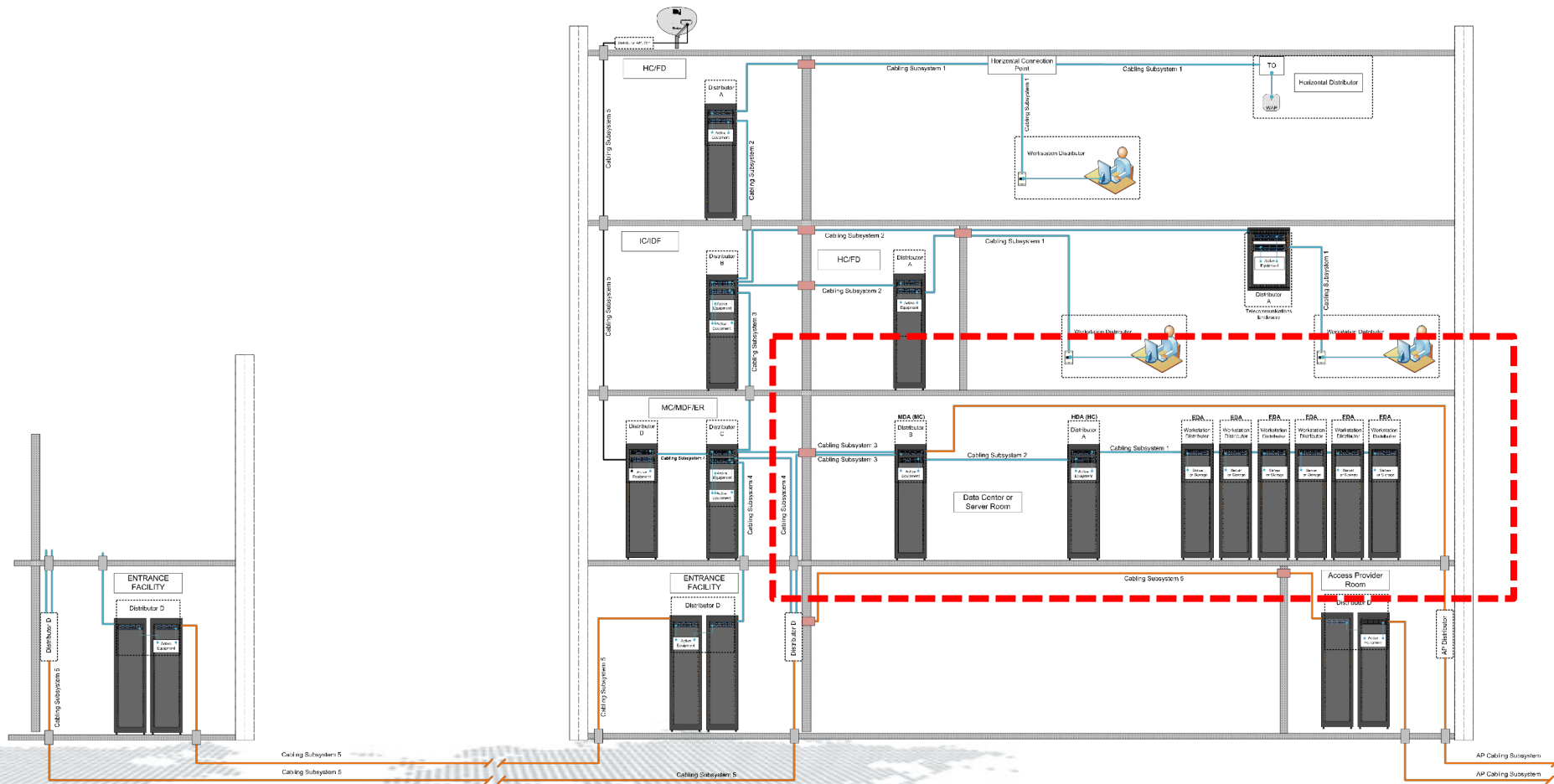
Room Rack Position Make Model Asset Number IP Address	Port Type Speed VLAN	Colour Cable Label Type Length	Port Type Speed	Room Rack Position Make Model	Type Length	Room Rack Position Make Model	Port Type Speed	Colour Cable Label Type Length	Port Type Speed VLAN	Room Rack Position Make Model Asset Number IP Address
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Contact Purpose Request date Request Number Project Code / Ref	Work number Path reference Scheduled date Installed status Path length
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The spreadsheet data has now grown to up to 60 columns wide!

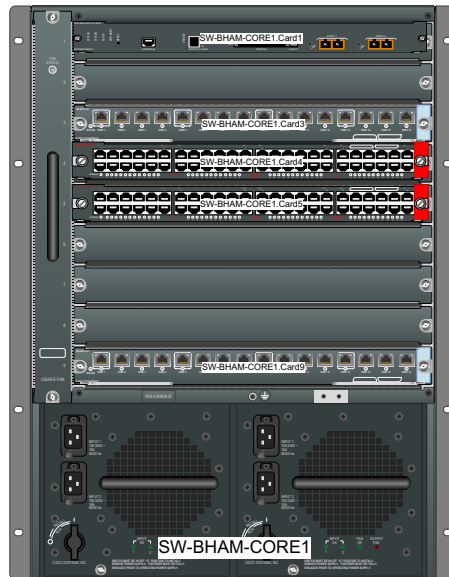


And Cabling Extends Beyond The DC!



Define Active Device Naming

	Device Name
1) Logical Name	US-SW-DC02-03P
2) Type of device / location	Cisco 6509 DC02-B03-U2
3) Asset Number	Asset HW0078732



Device component – Switch Card
US-SW-DC02-03P Card3
Cisco 6509 DC02-B03-U2.Slot03
Asset HW0078737



Device component – Blade Server
UX-NY0445-PROD
HP BL685C BLNY05-DC02-B03-U2.Slot03
Asset HW0078143

Define Infrastructure Naming



24 Port Copper Patch Panel



288 Port Fibre Panel

Patch Panel

AB

B03-AB

B03-5

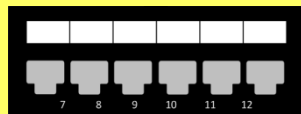
US-NY-DC05-H1-B03-5

PP B03-AB-U5

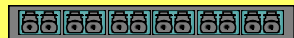
PP B03-AB-U5 to H07-AC-U2

PP B03-AB-U5 to H07-AC-U2/H06-AG-U9

PPC B03-AB-U5 to H07-AC-U2:Ports 01 to 24



6 Copper RJ45 Ports



6 Fiber LC Ports

Port Selection

AB-A Ports 1-6

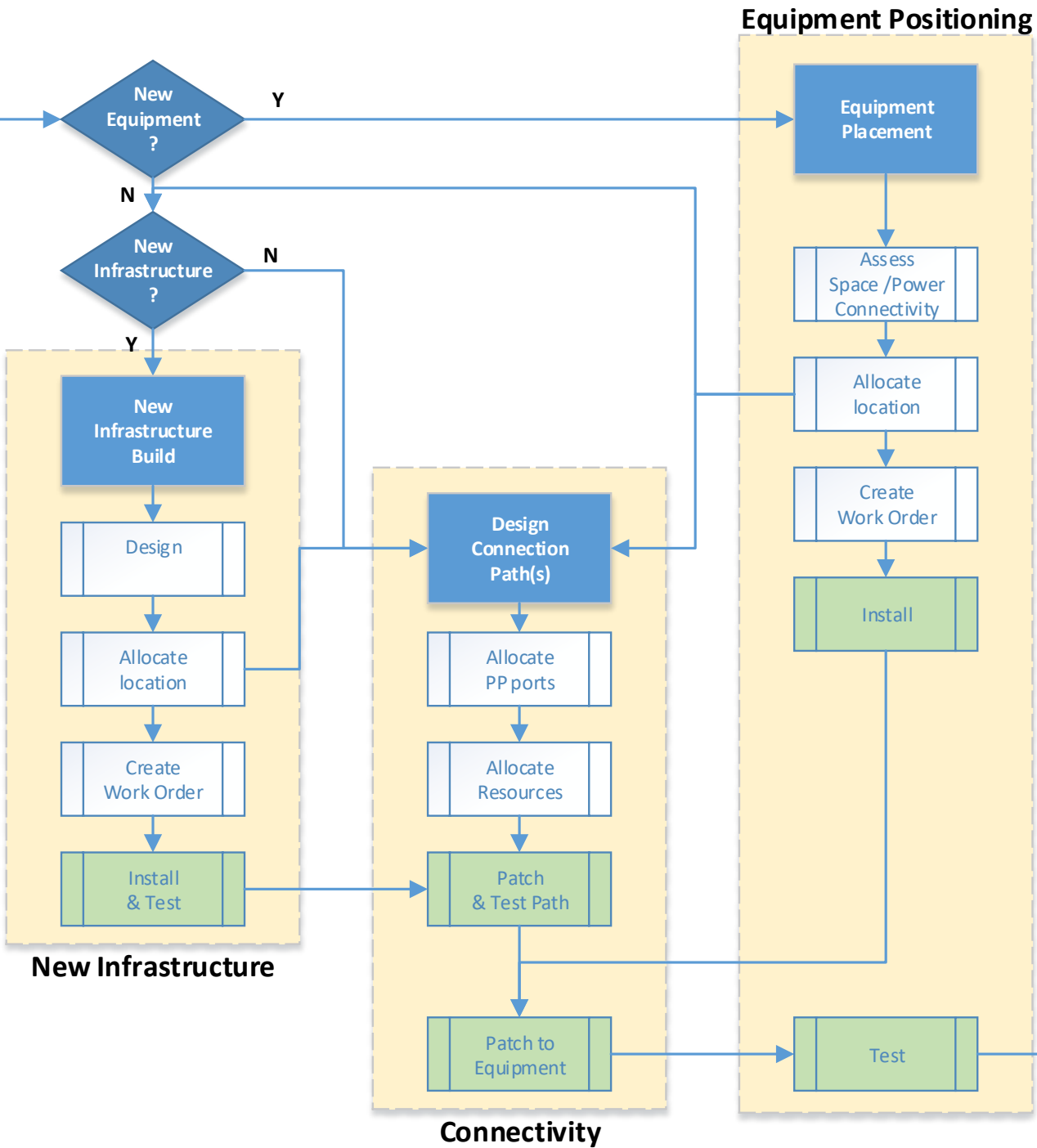
H07-AC-B Ports 7-12

PCI AB-A Ports 1-6 to H07-AC-B Port 7-12

AC-03B Ports 1-6

PFI B03-AB-03B Ports 1-6 to H07-AC-12A Ports 1-6

Data Center Change Request



Defining change process and team Interfaces

Installed And Working

Infrastructure Data Issues

1. Names and labelling of devices, ports, patch panels are often inconsistent. Keep them as simple as possible.

- Use external standards if helpful – TIA606B, TIA942
- As equipment vendors use various names for ports, decide on your standard
- Labels and administration identifiers may be different!

PP NYC-DC1-RM302-B03-AB-U5

Short code/label PP-AB-U5

2. Working practices will dictate when an update is carried out

- Request, design, issue design docs, make change, complete
- A spreadsheet will be locked by one user, so look at a database option

3. But you will need other views / perspective to manage connectivity

- Capacity reporting, device views, diagrams

Case Study Two - Airport

Scope	350 Buildings	- growing to over 400
	Data cabling	- inside and outside connectivity
	Power	- equipment rooms / data centers
	Devices	- anything with data connection

Step 1 Assess / define standard for naming / schematics

Step 2 Consolidate data and audit where needed

Step 3 Define process and educate on systems and processes

In Hindsight

1. Maybe a spreadsheet wasn't the best way to start

- It gives structure, but isn't best suited to complex multi-site connectivity
- Loading a database is 4 spreadsheets – 1)buildings 2)racks 3)devices 4)connections

2. You have to manage inventory and maintain it before you can manage connectivity!

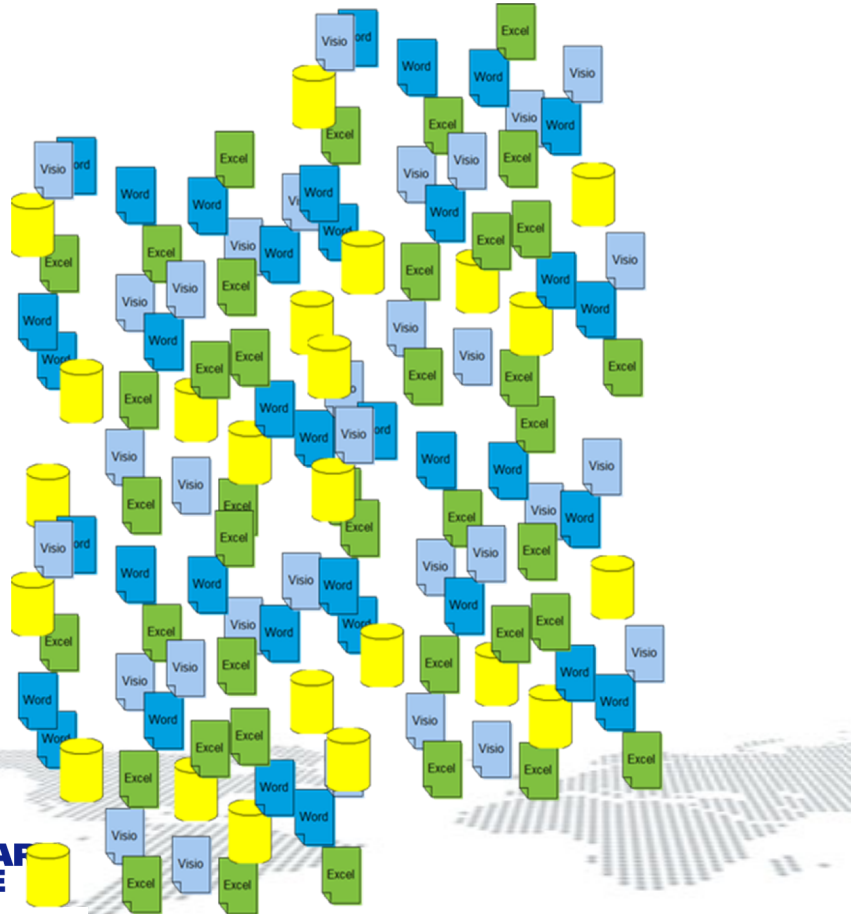
- Inaccuracies in data / naming are often present in other systems
- Without resolving naming issues, audits/ data capture may be wasted

3. Managing connectivity has to cope with the real world

- Complex device build – switches, servers, cabling distribution, pre-terminated cassettes, MPO, blown fibre, diverse paths, etc.

Understand - Before You Start

Many 1,000s of documents are created by projects, operations and risk processes



Lists/Database



Pictures

Commercial

Physical

Logical

Business

Ownership

Room ★

LAN ★

System

Support

Rack ★

SAN ★

Service

Software

Cabling ★

Virtual
Machines

Applications

Security

Power ★

OS

User Data

Contracts

Hardware Bud ★

Remote Mgmt ★

DR Plan

Licences

Backup

Environment

Change Impact

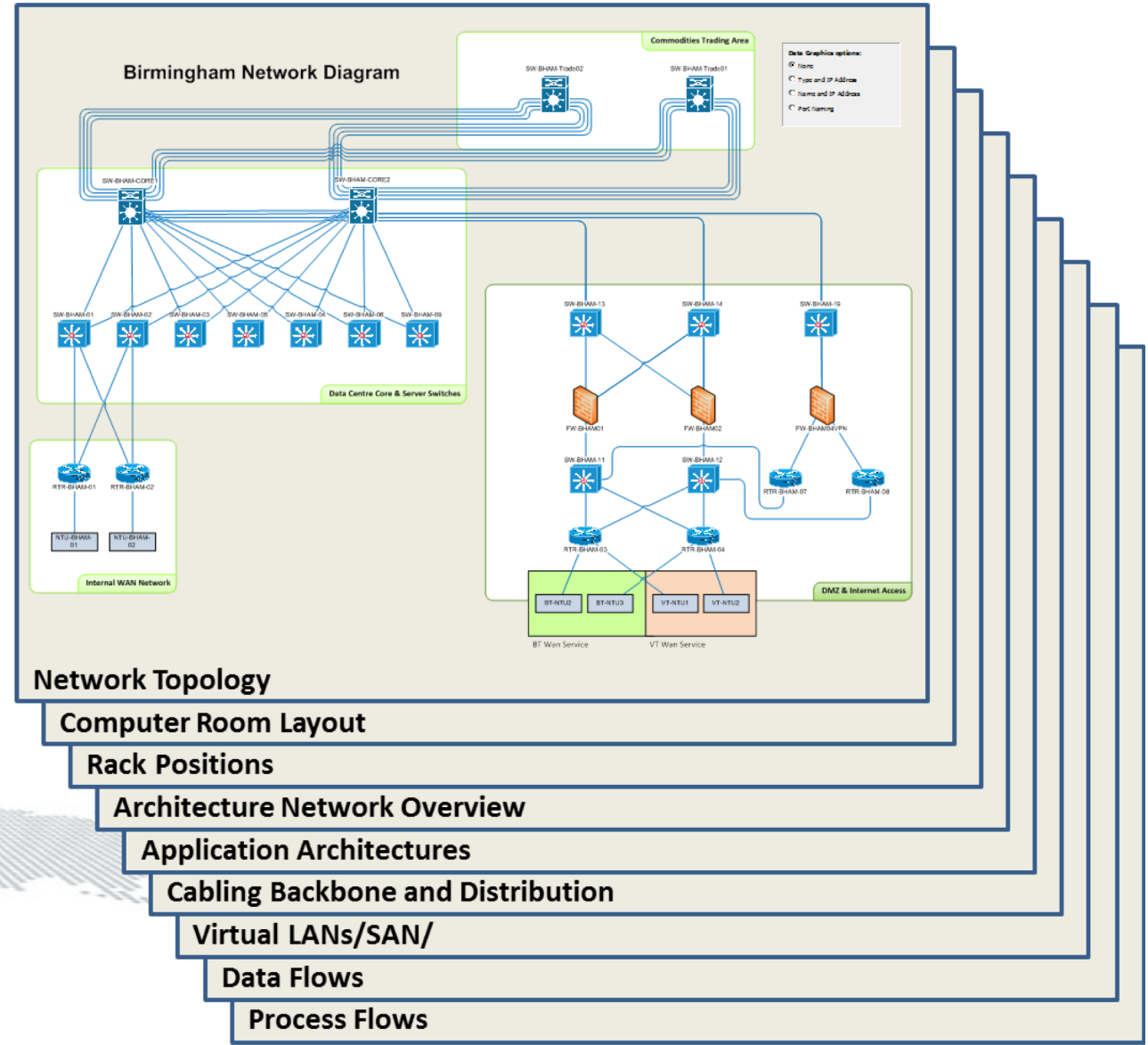


One Server ,
Multiple Mappings and Diagrams



The Bigger Picture – Think Forward

- Physical locations
- Hardware inventory
- Physical connectivity
- Logical connectivity
- Rack capacity
- Port capacity
- Asset lists
- Project plans
- Work orders
- Alternate paths / SPOF
- Monitoring toolsets



A More Strategic Approach

Physical Changes

- Location and position
- Resource reservation for projects
- Physical connectivity
- Audits and manual data gathering
- Impacts and dependencies
- Adds, moves and changes

Updates



Trusted sources

- Discovery systems
- Monitoring tools
- Service desk CMDB
- Spreadsheets – risk, contracts
- Recovery plans
- Project handover

dB Excel Visio Word

Updates



References

Infrastructure Database(s) & Reporting

Outputs



Typical Outputs

- Capacity management – space, power, connectivity
- Change impact analysis – impact, risk, auditing
- Excel: Inventory extracts, Custom reporting
- Visio: Physical plans, Floor and rack diagrams
- Visio: Topology diagrams, Networks, power, storage
- Visio: System & Architecture Maps, ITIL services, applications

In Summary - When?

1. Multi-site, multi-technology connectivity management often requires simplification and consistency to be made easy. The normal end goals are speed of change (often reducing cost) and increased control.
2. If you document data connectivity of everything that has a data connection, you might as well document power in the same way for data center and power management.
3. If you don't manage connectivity, expect frustration and unpredictable project delivery. Be wary of auditors as connectivity shows up internal process gaps. Once control is lost it can be very expensive and time consuming to regain it – a connectivity audit!
4. Think about the use of specialist tools, rather than Excel or a self developed database.

Additional Material

www.tiaonline.org

ANSI/TIA568C, ANSI/TIA606B, ANSI/TIA942

www.bicsi.org

ANSI/BICSI-002

www.squaremilesystems.com



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