“Avoiding High Density Spaghetti” - Managing High Density Modular Cabling Systems

David Cuthbertson

Square Mile Systems

Is Managing Cabling Boring?

- It is not seen as important as delivering projects
- It is difficult
  - Lots of spreadsheets
  - Very detailed and prone to error
  - Too many people involved in changes

Brocade DCX
256 / 512
fibre ports
+ copper

- Inconsistencies and technologies make it complex
- Very costly to sort out once control is lost
- Not a career path for most (or all) IT specialists

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Personal Background

Personal Experience

- Network Troubleshooting
- Cabling and Network Installations
- Managed Services Voice/Data

Industry Groups and Frameworks

Process Skills	Naming	Baselining
Methods	Labelling	Toolset Development
Communication	Change Process	Visio automation

LinkedIn Group Manager

Data Center Engineering
Data Center Operations Management

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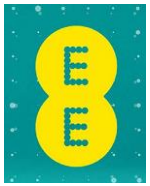
It's An Industry Challenge



But… We have to… Because…

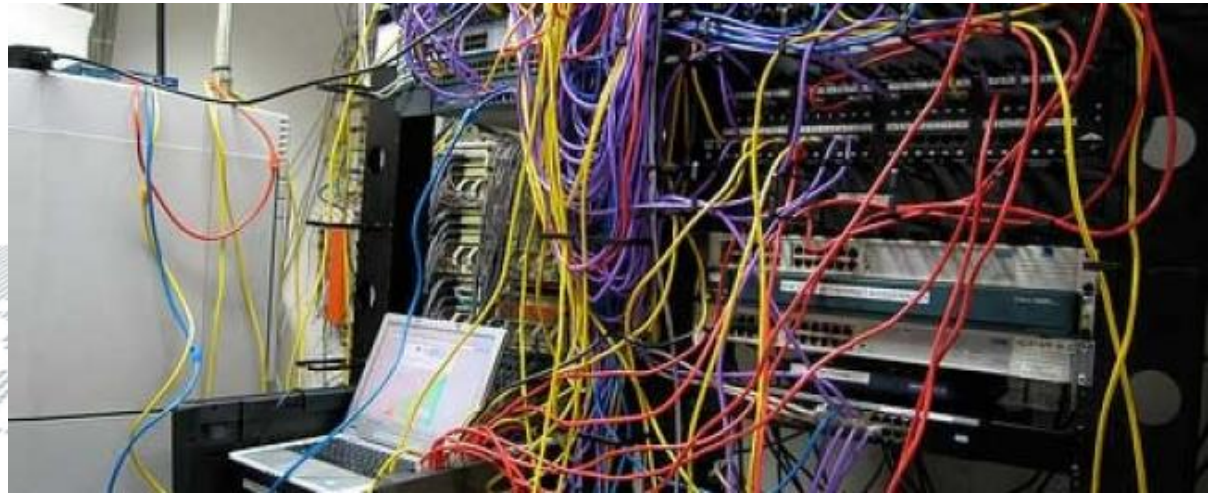
- Every cabling change costs time and money
- Impossible to manage changes centrally
  - Every project MADC could need a site survey
  - Creation of build documents is very time consuming
  - Interface with internal/external teams for delivery
- Disruption is still caused by physical layer changes
- Use resources effectively
  - people, switch ports, fibre
- Infrastructure can’t be secured, or attacks managed

Managing Connectivity

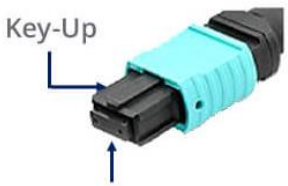
- V
- P
- !

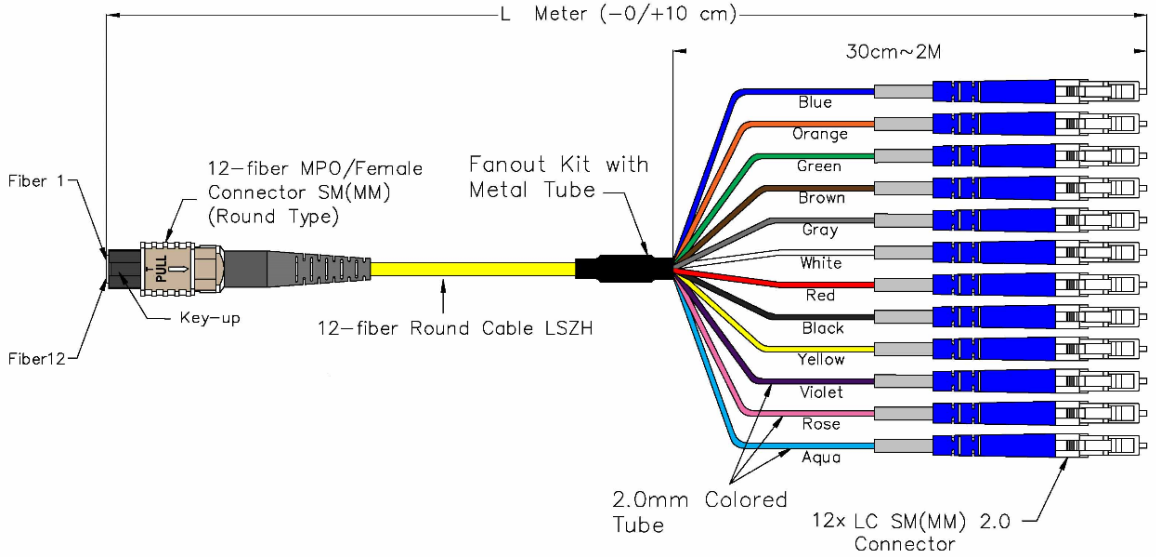
How Do We Cope?

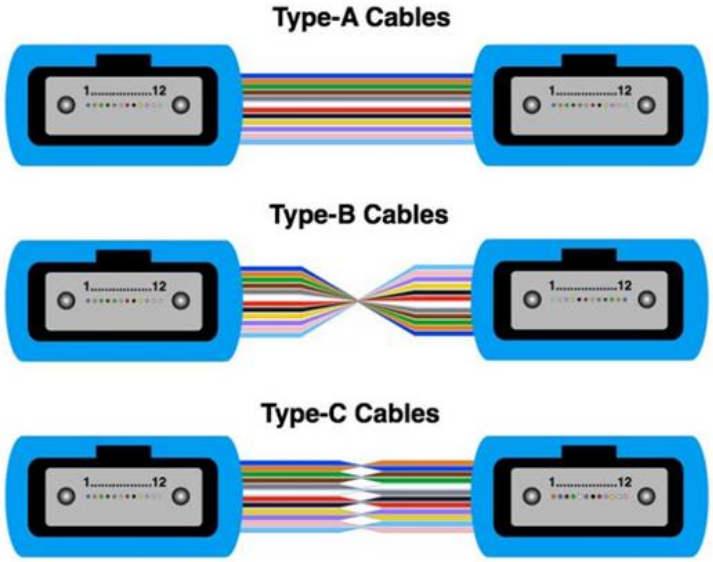
- Adopt industry best practices – where they exist
- Ensure operational processes are not the weakest link
  - Ensure clarity on roles and practices
- Make the complexity easier to manage
  - Clear naming, labelling and documentation
  - Reduce the number of data sets needed for governance and control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



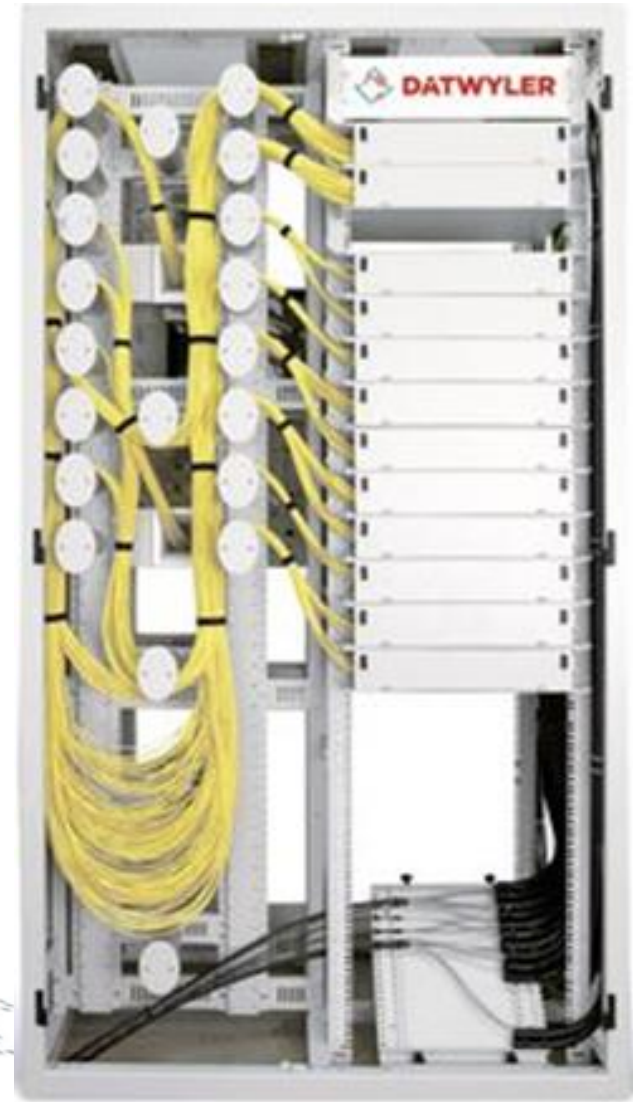
High Density Fibre – Multiple Port Types



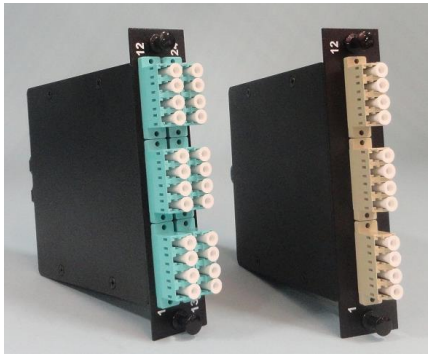




ODF Presentation



High Density - Presentation



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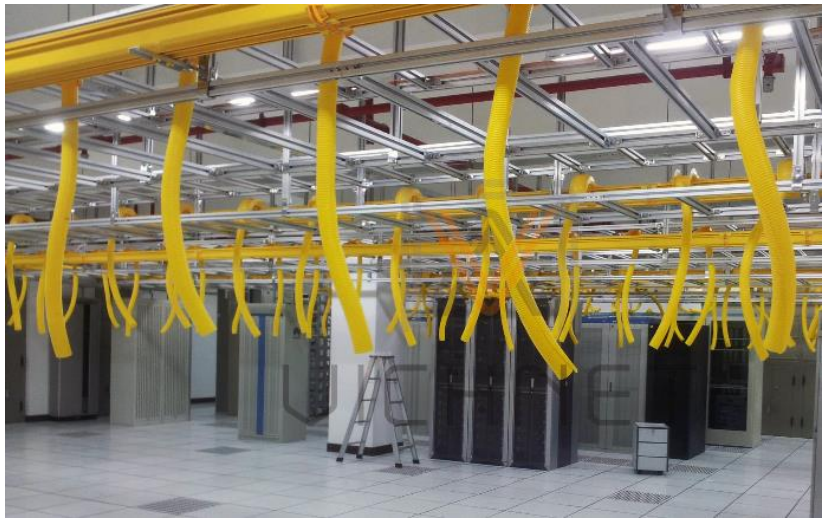
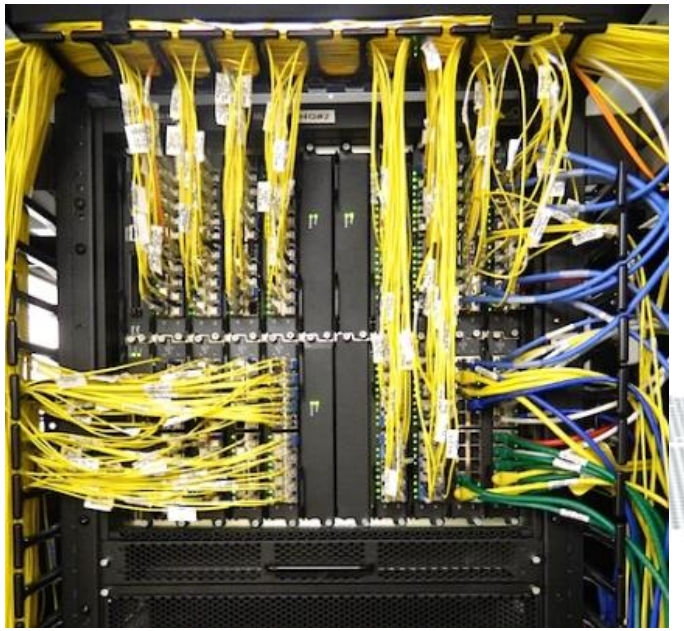
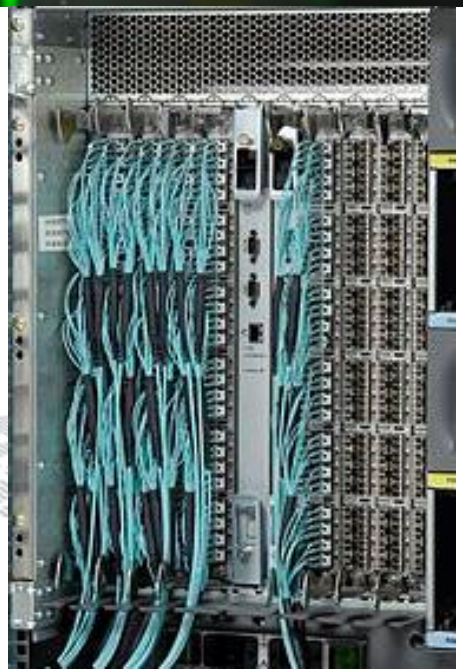
And The End Equipment







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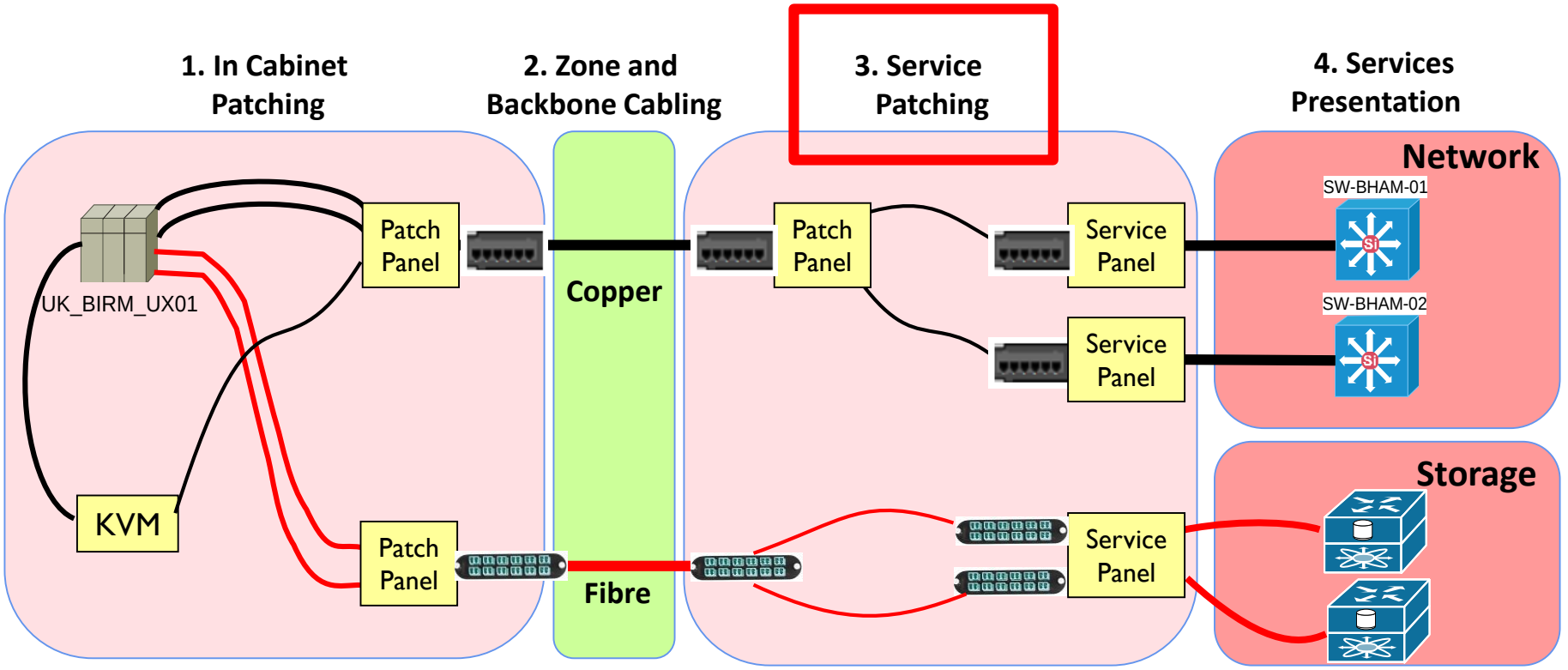
Multiple Options



It makes sense to present services in patch panels with high density cabling

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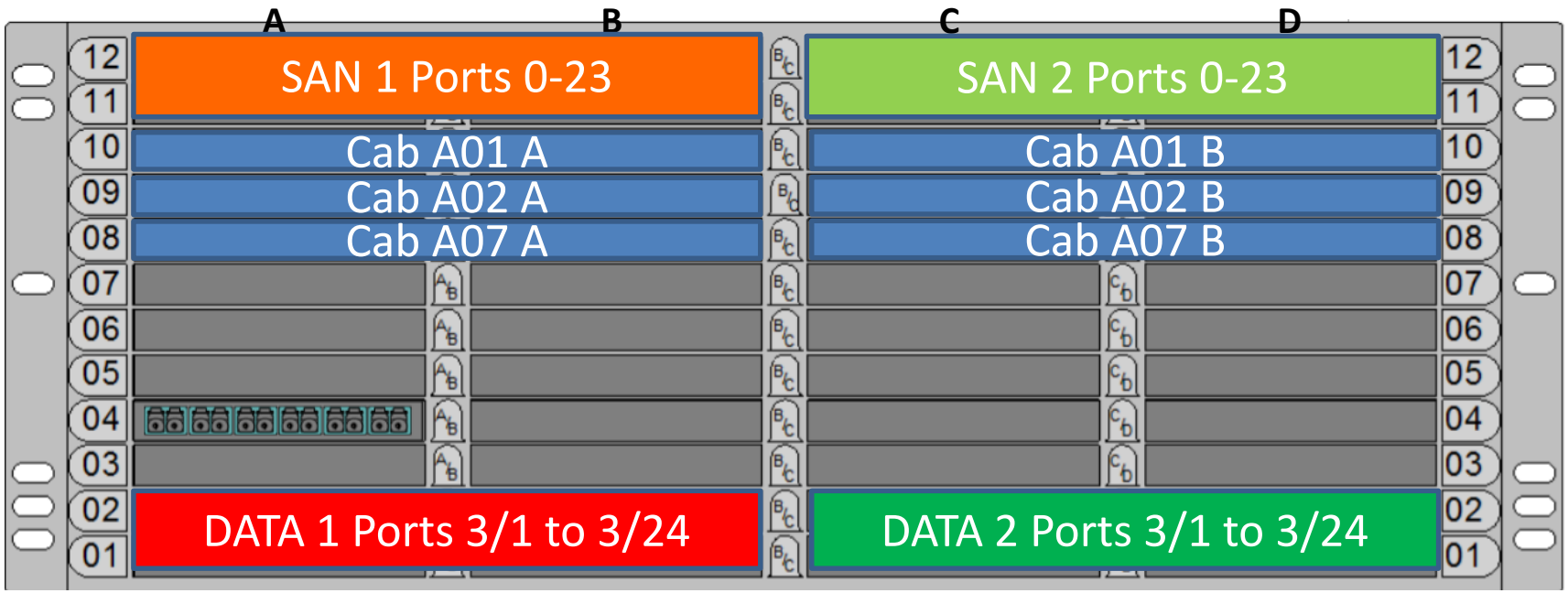
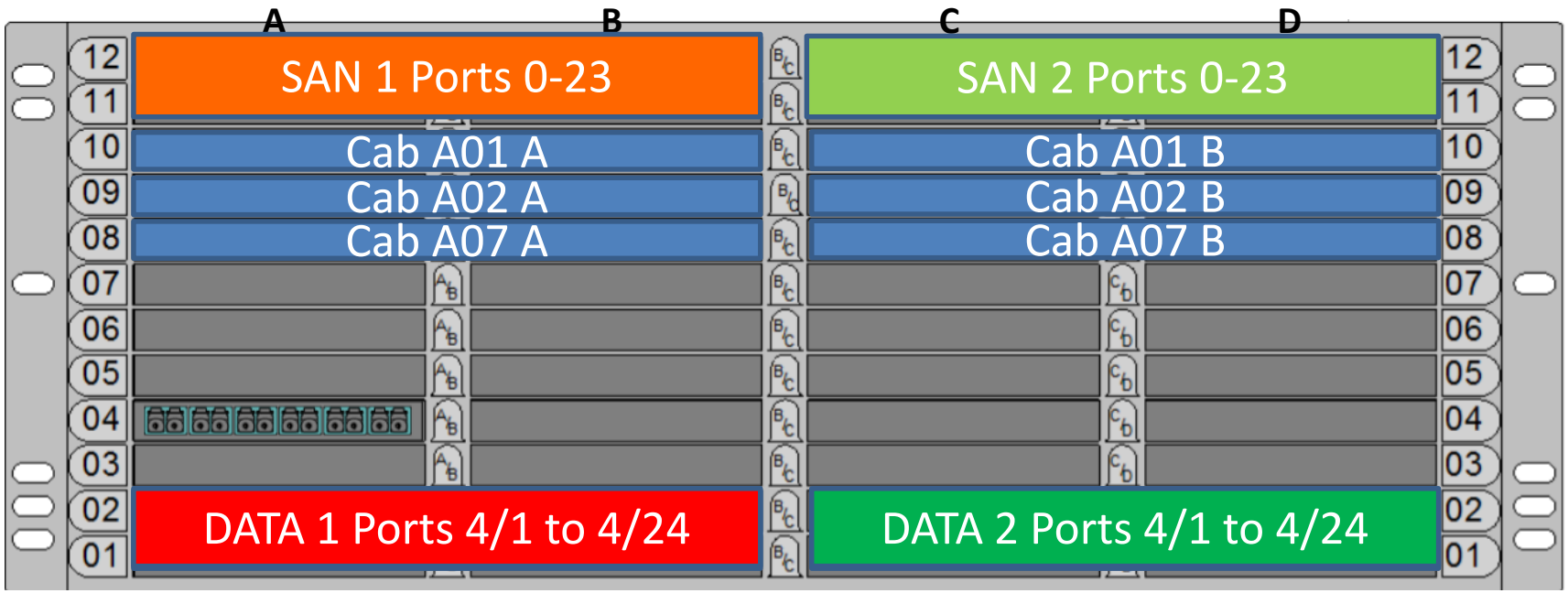
When We Go Modular



✓ Easy to add, move, re-use modules and connections

✗ Not so easy to document, manage capacity and comprehend

Change In Data Requirements



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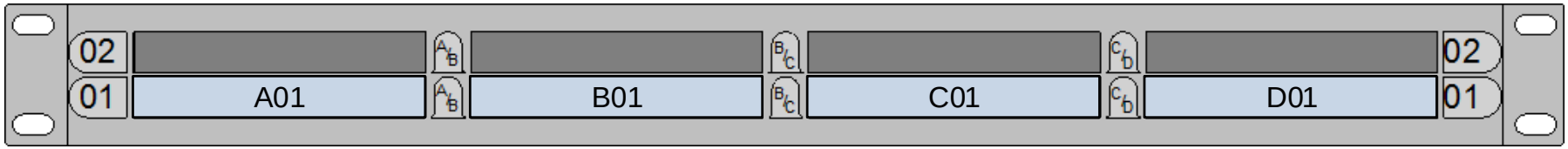
Hmmm.. Naming.. Modules



A01	1. Slot name
A03 U39.A01	2. Rack/Panel and Slot name
DC1-A03 U39.A01	3. Room/Rack/Panel and Slot name
PFI-DC1-A03 U39.A01	4. Type/Room/Rack/Panel and Slot name
DC1-03-10 U39.C01	5. Destination far end and Slot

Hmmm.. Naming.. Modules

- Active Equipment - Easy
  - Use logical name SWNZ66_F301
  - Cards could be SWNZ66_F301.slot04

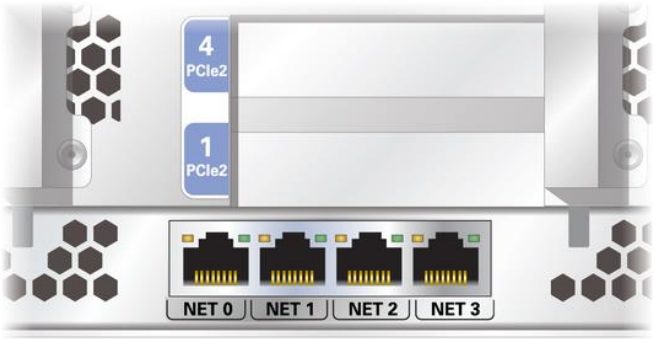
- Cabling Modules – Often uses location identifiers

Option A	Where it is	A05-U05.03A
Option B	Where it goes	A07-U07.07A
Option C	Both of the above	A05-U05.03A to A07-U07.07A
Option D	The end service	SWNZ66_F301.slot04:Ports 07>12

Plus module attributes – make, model, port type, orientation

Ports and Connections

Equipment – use the physical label?



- 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

Patch cable labels

1) port 2) local devices 3) end devices

4) full path 5) cable unique id 6) path unique ID

With dense panels, how big can the label be, what size of font can still be read?

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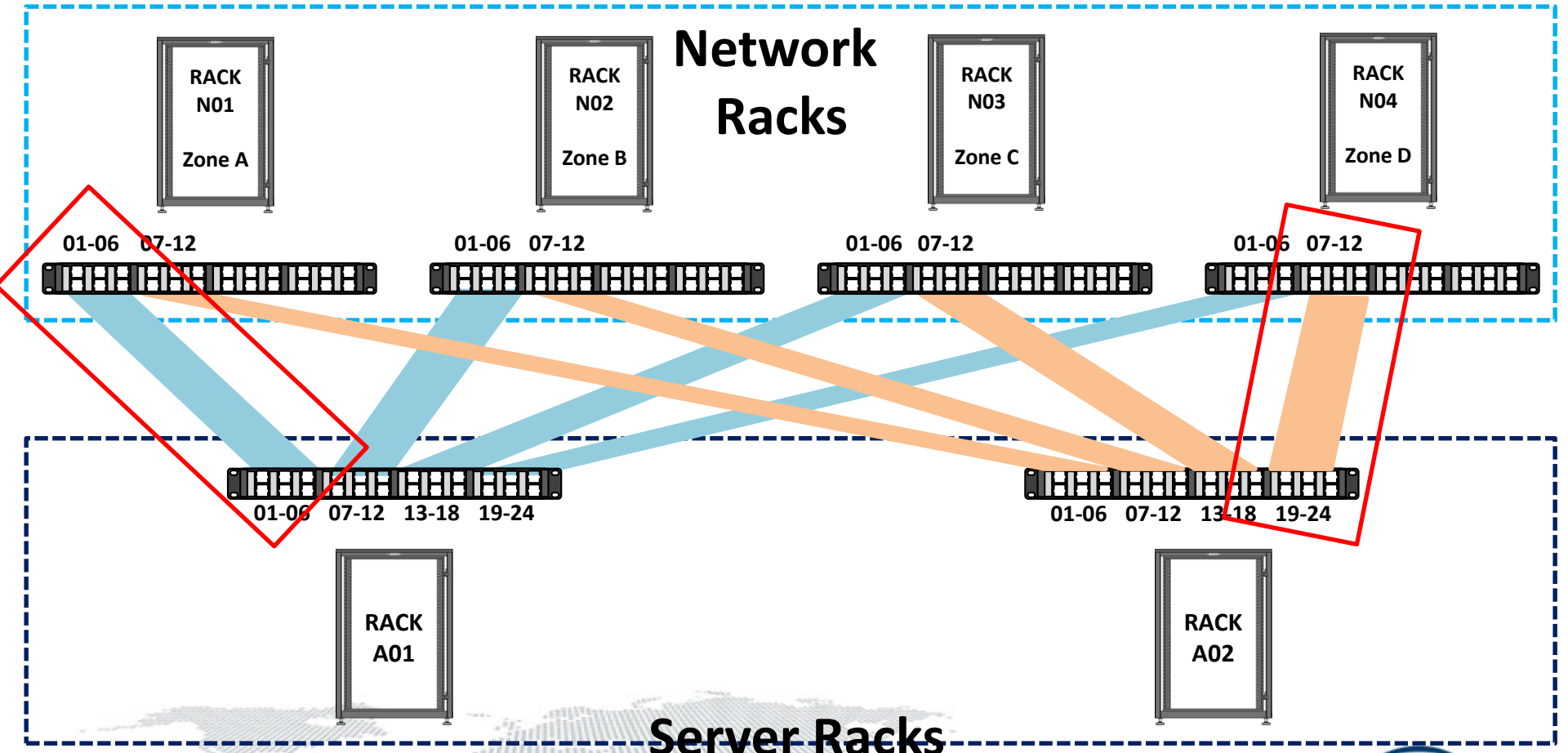
Multi-path Options



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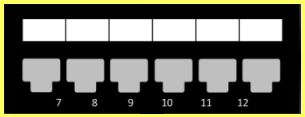
Design The Infrastructure Naming

24 Port Copper Patch Panel

288 Port Fibre Panel

Patch Panel

AB
B03-AB
B03-5
FM NY-DC05-H1-B03/C10
PP B03-AB-U5
PP B03-AB-U5 to H07-AC-U2
PPF 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:06
PFI B03-AB-03B:09 to H07-AC-12A:03

High Density Connectivity - Challenges

1. Designing for flexibility and control – rightsizing
2. Planning
   - Requires common inventory of cabling and hardware components
   - Local environment awareness - distance and paths
   - Planning documents – time to complete
3. Build and operate
   - Locations and cable lengths
   - Naming and labelling
   - Verification and fault finding – wiggle, twist, pull, hope, deny, run
   - Decommissioning
4. Getting a baseline for better change workflow
   - It costs a lot to do to repeat site surveys and multiple audits

In Some Environments

- Engineers called in at all hours to help troubleshoot
- Changes made in racks without coordination
  - No labeling, wrong patch lengths, bad cable routing
  - Equipment installed wrong way round for cooling
  - Cabling spaghetti
- Surveys done for all changes + written build docs
- Projects delayed with managers often escalating
- Extra contract staff taken on to cope with workload
- Quarterly audits to gather capacity data

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Moving Forward

Infrastructure Planning Team

Space, Power Connectivity

WHY	Cost reduction Shorten project delivery timescales Support operational troubleshooting Flexible use of 3rd parties for local build Ensure controls are applied globally - consistently
HOW	Defined roles and interfaces Standardised naming conventions Baseline audit and resolve non-conformities Moved from spreadsheets to a database Evolving with new technologies

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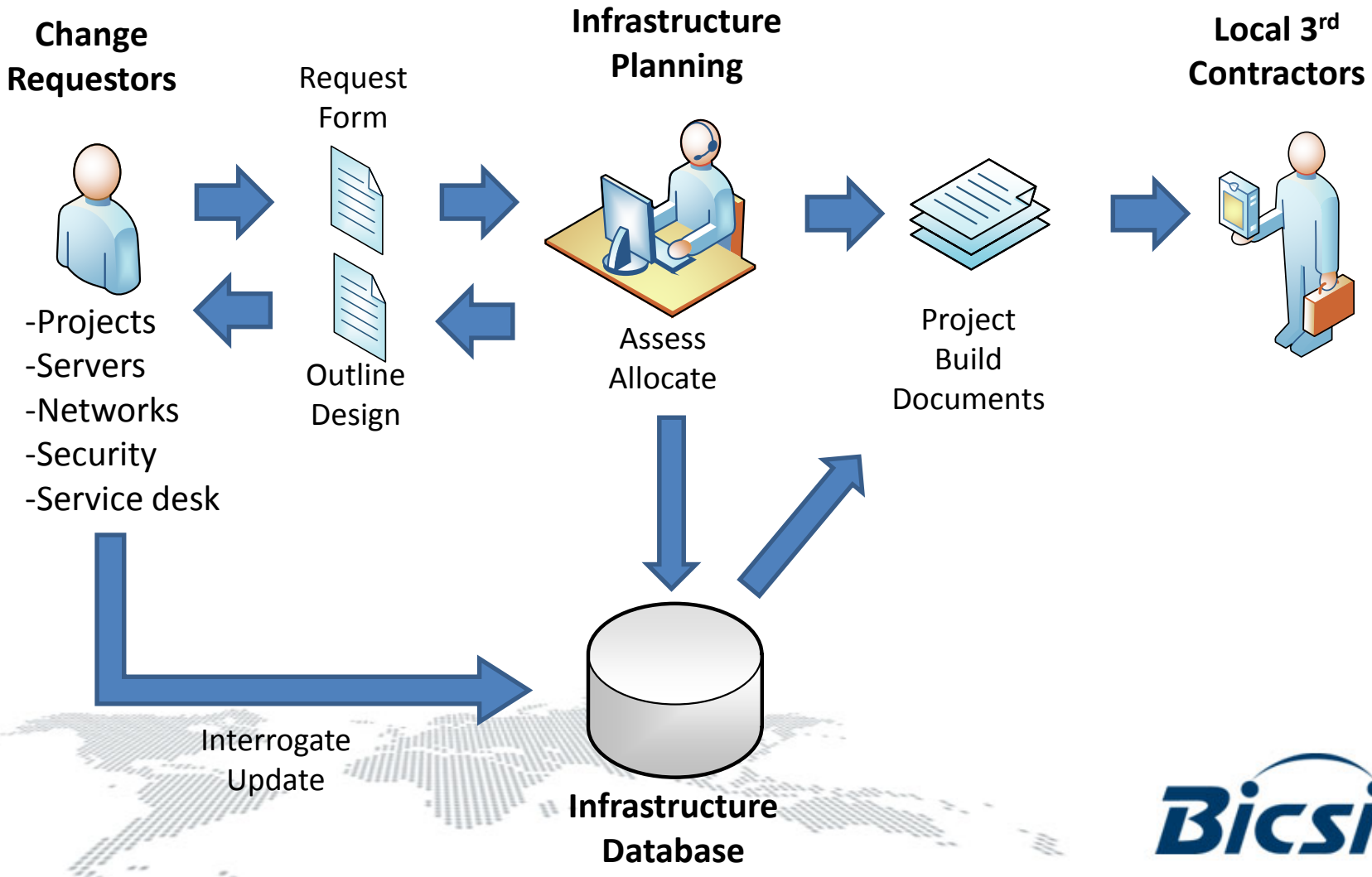
How Do We Change?



It’s Not Difficult – Really!

Infrastructure
Planning
Team

Space,
Power
Connectivity

Kansas City
DR / Test

St Louis
Missouri DC

New York
US HQ

Brussels

Sydney

Sao Paulo

Beijing

London

Melbourne

Buenos Aries

Seoul

Amsterdam

Singapore

Costa Rica

Auckland

+78 other locations

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To Avoid “High Density Spaghetti”

1. **Connectivity management needs good planning and install processes that are simple and quick**
   - Get the benefits of flexible, modular systems and be in control
   - Ensure cable lengths and management bars are appropriate
   - Verification checks on implementation and labelling
   - Requires records maintenance
2. **One day you will have to establish a baseline inventory and maintain it before you can manage connectivity capacity**
   - Without specifying and resolving naming issues,
   - Audits / data capture / resilience / capacity checks may not be maintained
3. **Connectivity options still continue to develop**
   - Complex device build – switches, servers, cabling distribution, pre-terminated cassettes, MPO, blown fibre, diverse paths, base-8, etc.

Additional Material

www.tiaonline.org	ANSI/TIA568C, ANSI/TIA606B, ANSI/TIA942
www.bicsi.org	ANSI/BICSI-002

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SMS Visio utilities	Free downloads and videos

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