HDBT™

Alliance Webinar

16-Jan-2018

advoli™

Framework for Digital Signage Architecture, Design Challenges and advoli's Novel Solutions

Presented by

Paul Torkehagen & Clas Sivertsen

About the Installer Zone

- A dedicated online portal with resources for installers, integrators and AV professionals
- Best practices, case studies, white papers, Installer Expert Program and live forum
- Thousands of registered users, from all over the world
- Learn more: http://hdbaset.org/installers/

About Advoli

advoli has developed the world’s first HDBaseT Certified Graphics Card. advoli is a contributing member of the HDBaseT alliance and actively develops new HDBaseT products, never before seen.

Presenter’s Bio

Development - Clas Sivertsen

Commercial - Paul Torkehagen

Clas is a serial inventor with over 90 patents to his name. An expert in electric, mechanical and thermal engineering, with a passion for designing complete systems from concept, through architecture and actual schematics, PCB layout and firmware, as well as designing clever mechanical enclosures and instrumentation.

He also has a part time interest in organic chemistry and molecular biology, with a special interest in genetics, epigenetics, and virology.

Clas formerly worked 18 years at American Megatrends Inc. and where he ended his tenure as Vice President. Clas was also the founder and chairman of Digbil.

Paul is serial entrepreneur and has a background in innovation and strategy from work as a consultant and a part-time educator.

He has a B.Sc in Information Systems Management with a second major in Marketing from Singapore Management University, Singapore, and an MBA from Hult International Business School, Shanghai where he had a three year stint as visiting faculty teaching innovation and strategy to bachelor, master and MBA students on consulting projects with fortune 500 companies.

Paul spends a quarter of his time being a student of electrical engineering under Clas and the other three quarters co-inventing, sourcing, partnering and managing the business and strategy aspects of Advoli. He has a passion for simplifying complex systems and has a keen interest in continuos learning.

Our Assumptions

You are familiar with HDBaseT Technology and 5 Play

What this Presentation Will Cover

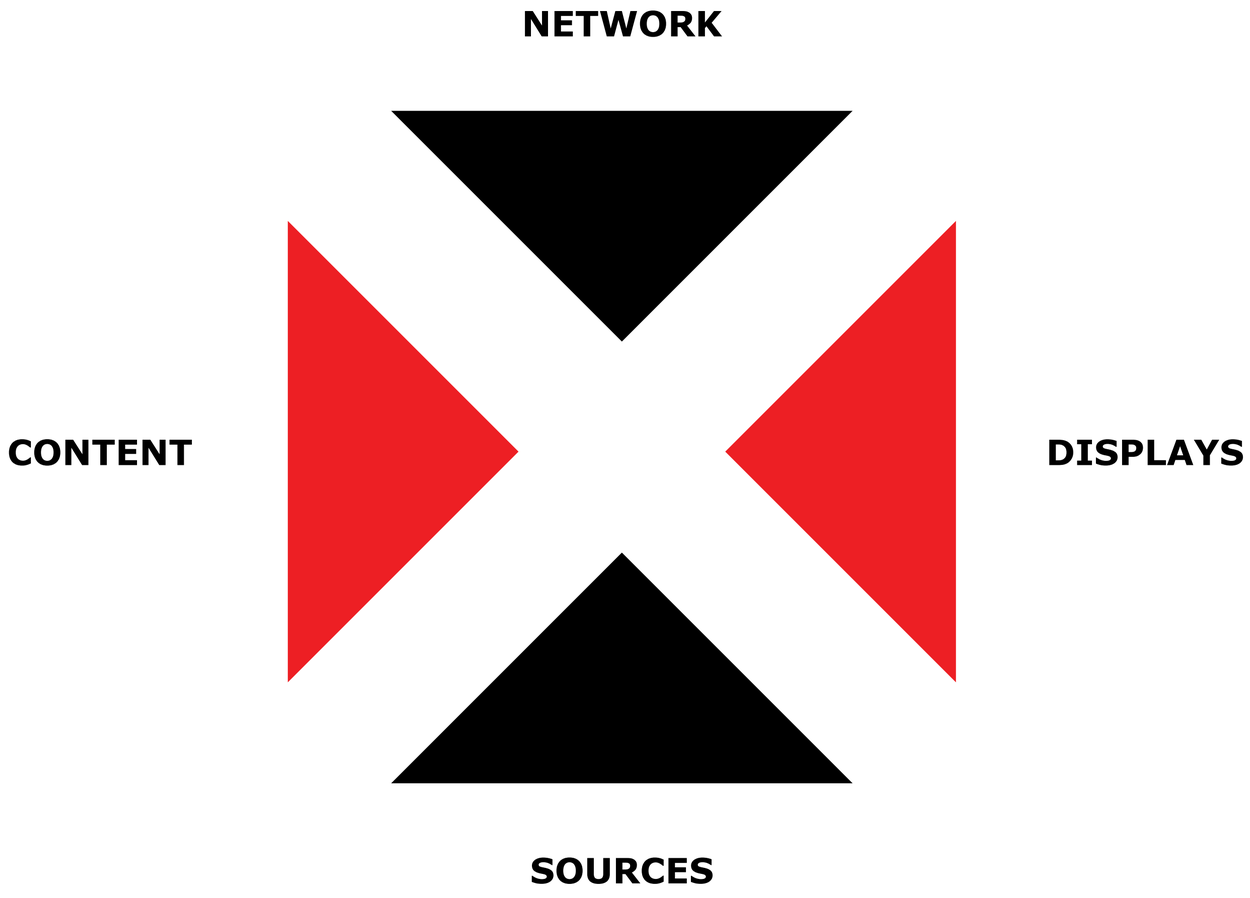
- A guiding framework to help structure your thinking, innovate and build business value
- Some key hardware challenges and insights
- How advoli has tried to solve these challenges and in the process provide system integrators with more value
- 3 real life use cases

Zachman's Framework for ~~Enterprise Architecture~~ ('92)
Digital Signage Architecture

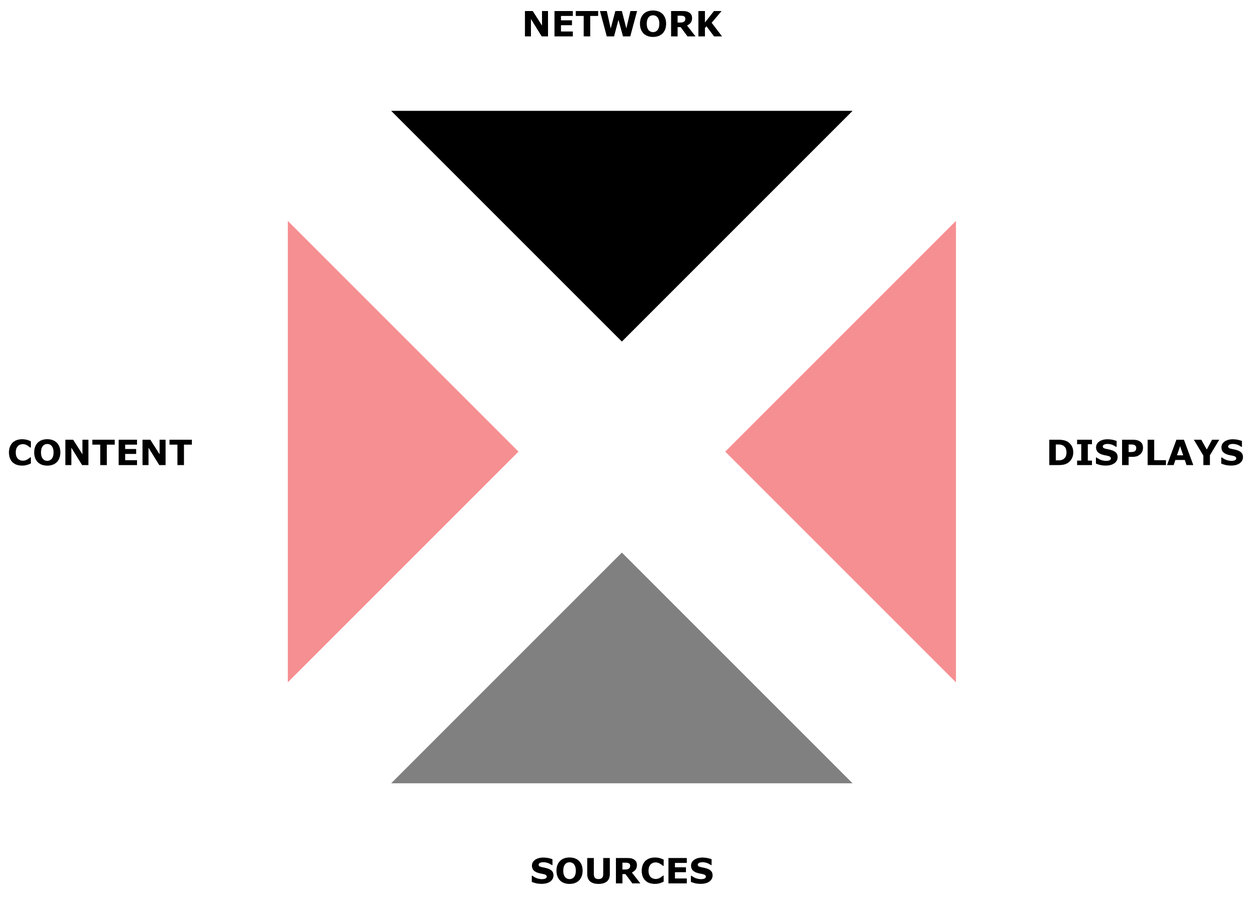
	WHAT	HOW	WHERE	WHO	WHEN	WHY	
	DATA	**FUNCTION**	**NETWORK**	**PEOPLE**	**TIME**	**MOTIVATION**	
SCOPE (Contextual) Planner	List of Things Important to the Business	List of Processes the Business Performs	List of Locations In Which the Business Operates	List of Organizations Important to the Bsuiness	List of Events/Cycles Significant to the Business	List of business goals/strategies	**SCOPE (Contextual)** Planner
BUSINESS MODEL (Conceptual) Owner	e.g. Semantic Model	e.g. Business Process Model	e.g. Business Logistics System	e.g. Work Flow Model	e.g. Master Schedule	e.g. Business Plan	**BUSINESS MODEL (Conceptual)** Owner
SYSTEM MODEL (Logical) Designer	e.g. Logical Data Model	e.g. Application Architecture	e.g. Distributed Systems Architecture	e.g. Human Interface Architecture	e.g. Processing Structure	e.g. Business Rule Model	**SYSTEM MODEL (Logical)** Designer
TECHNOLOGY MODEL (Physical) Builder	e.g. Physical Data Model	e.g. System Design	e.g. Technology Architecture	e.g. Presentation Architecture	e.g. Control Structure	e.g. Rule Design	**TECHNOLOGY MODEL (Physical)** Builder
DETAILED REPRESENTATIONS (out-of-context) Subcontractor	e.g. Data Definition	e.g. Program	e.g. Network Architecture	e.g. Security Architecture	e.g. Timing Definition	e.g. Rule Specification	**DETAILED REPRESENTATIONS (out-of-context)** Subcontractor
FUNCTIONING ENTERPRISE	e.g. DATA	e.g. FUNCTION	e.g. NETWORK	e.g. ORGANIZATION	e.g. SCHEDULE	e.g. STRATEGY	**FUNCTIONING ENTERPRISE**

Source: https://www.zachman.com/images/ZI_PIcs/ZF3.0.jpg

Digital Signage Architecture



Digital Signage Architecture



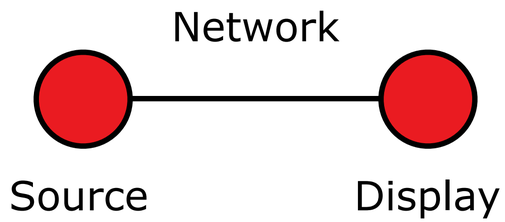
Be Careful With Your System Security

Security Management	Patch Management Centralized Management
Application Security	Antivirus Application Firewall
Network Security	Network Firewalls VPN Web/Conent Filtering Intrusion Detection & Prevention
Data Security	Authentication (HDCP), Encryption
Physical Security	Asset Protection (locked in server room)

NOT 7 Layers of OSI Model

Understand Your System Reliablity

Management Reliability	Human error
Application Reliability	Application bugs, updates etc…
Network Reliability	Network downtime due to security, technical errors, connectivity etc..
Data Reliability	Data is sufficiently complete and error free
Physical Reliability	Unplugging Cables, power, pests, burn outs, over heating etc..



Management Reliability	99.9%
Application Reliability	99.9%
Network Reliability	99.9%
Data Reliability	99.999%
Source Physical Reliability	99.99%
Cable Physical Reliability	99.999%
Display Physical Reliability	99.99%
Total System Uptime	99.68%

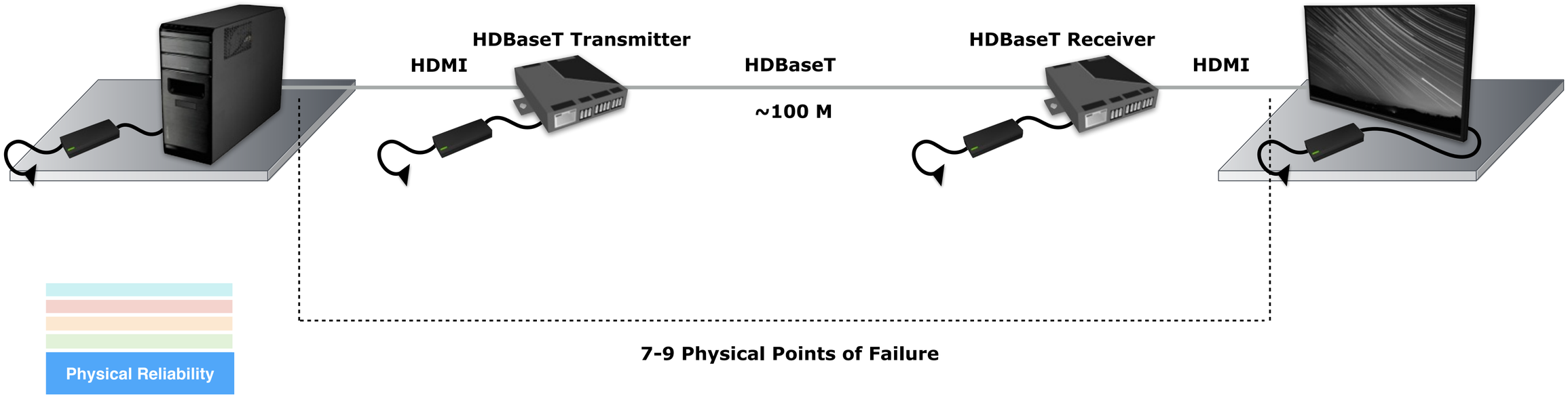
99.68% x 365 = 363.83 Days Uptime Per Year

OR

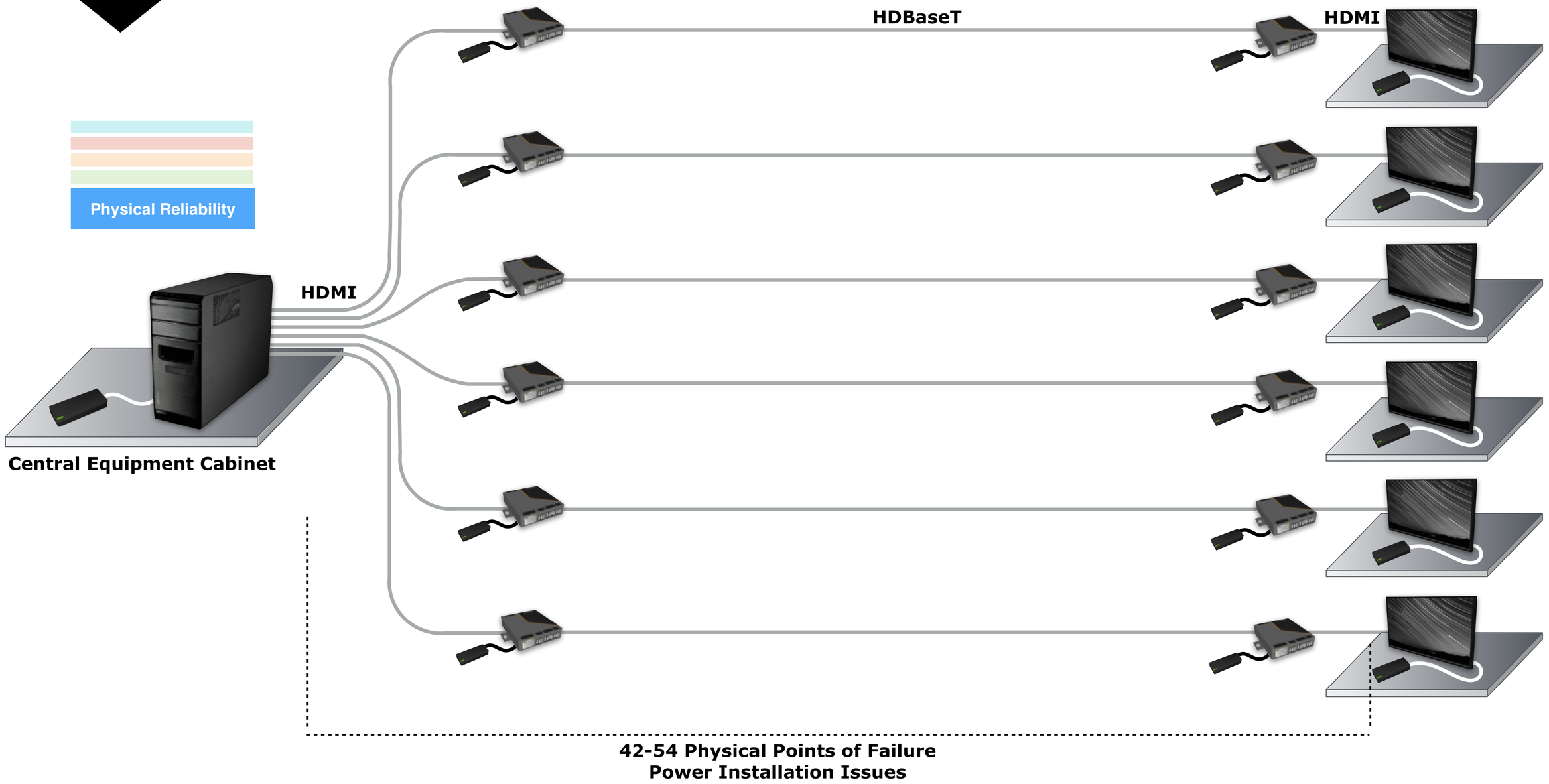
1.17 Days OR ~28 Hrs Downtime Per Year

NOT 7 Layers of OSI Model

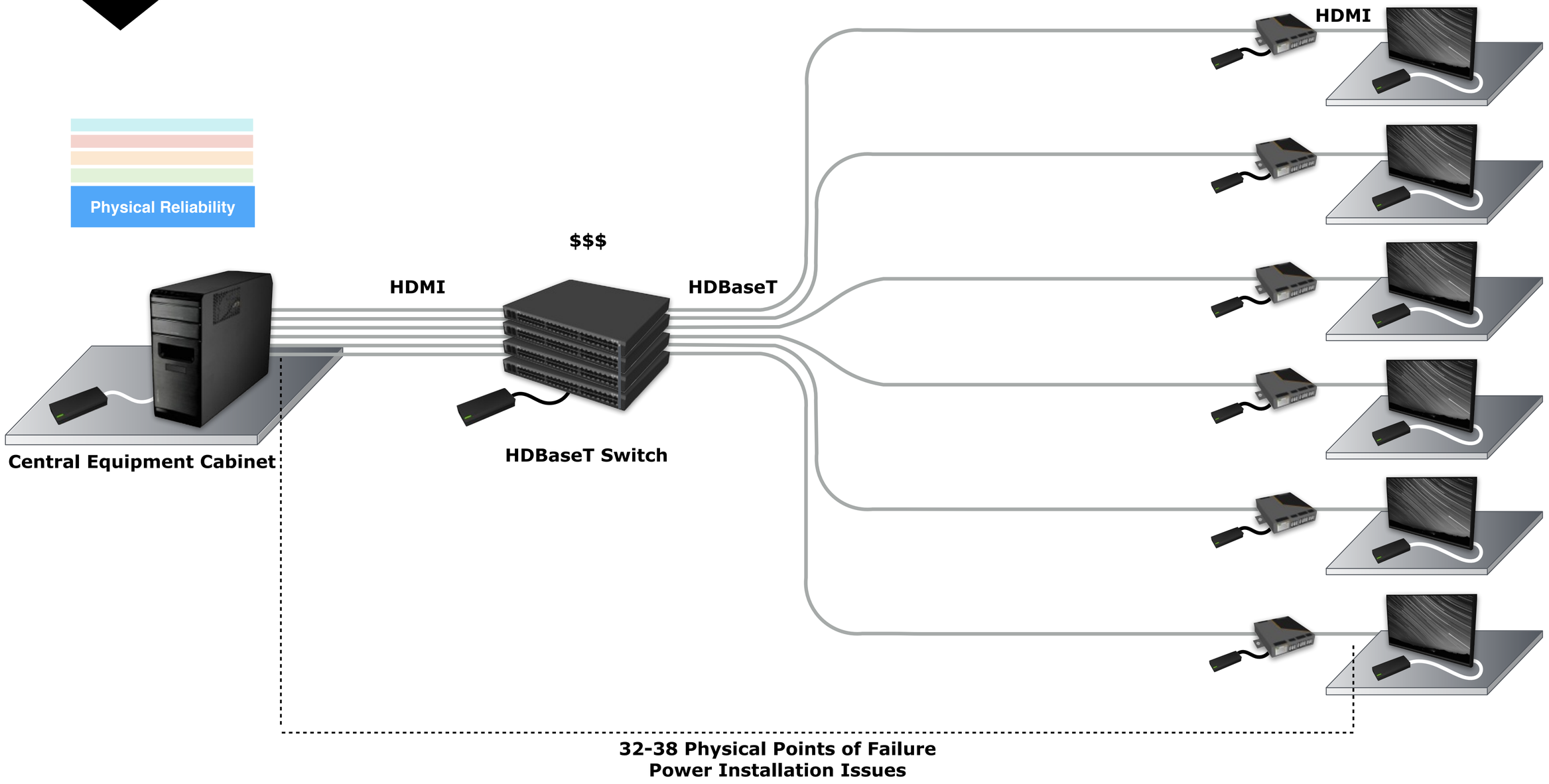
Network Reliability Real Life



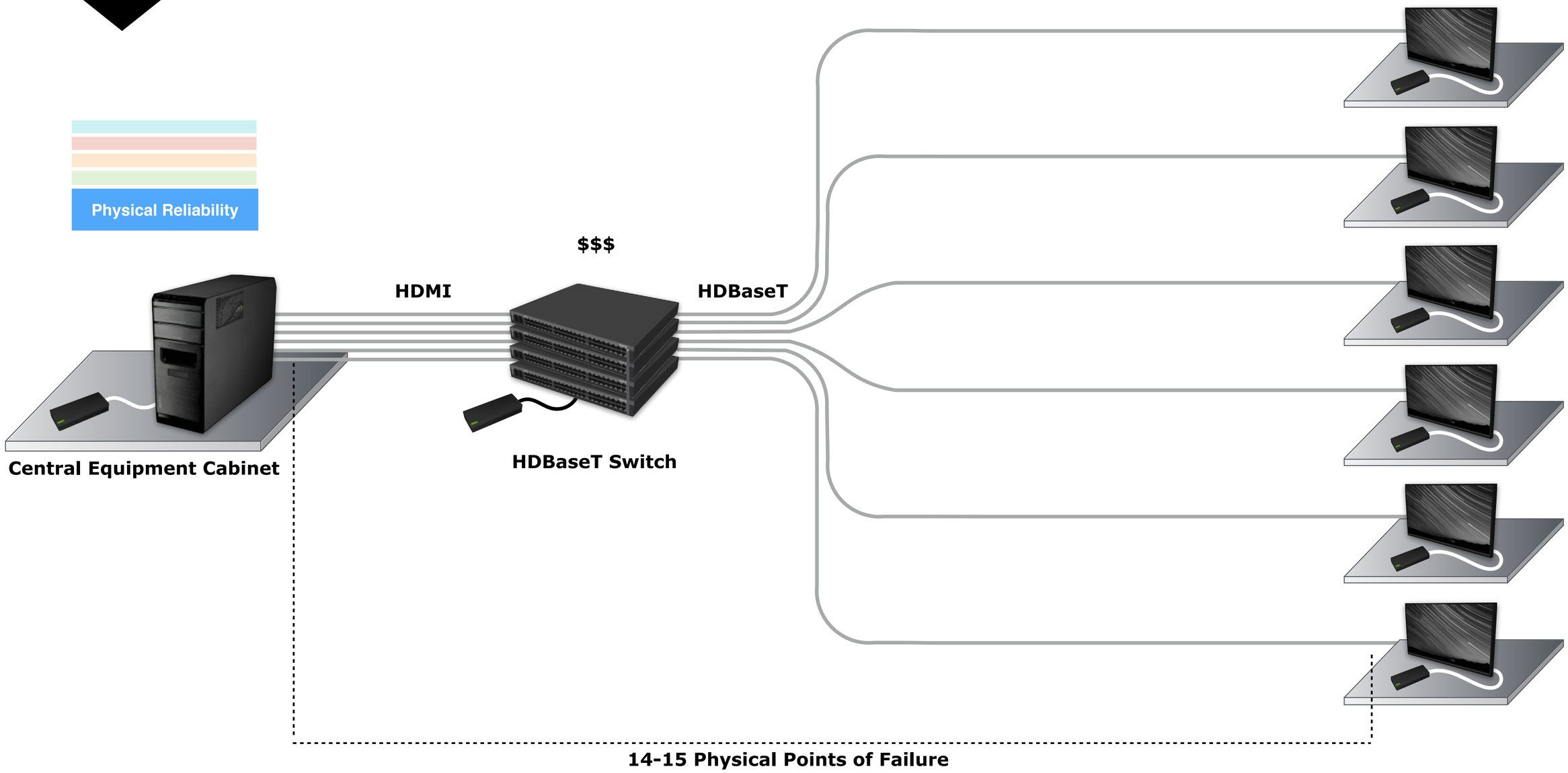
Network Reliability Real Life Continued



Network Reliability Real Life Continued



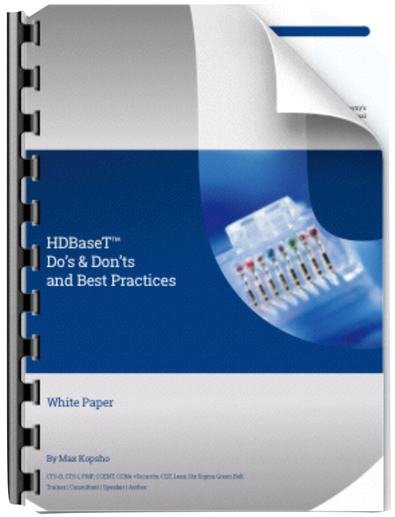
Network Reliability Real Life Continued

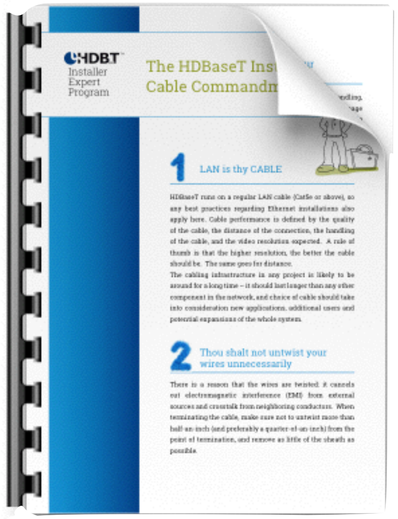


Follow The HDBaseT Alliance Cable Guidelines

- **Watch the webinars:**
  - HDBaseT Installer Expert Program: Webinar Cabling Best Practices
  - Simplifying Your Network with Power over HDBaseT (Webinar provided by UL)
  - InfoComm Webinar: New Applications drive the need for higher performing cabling

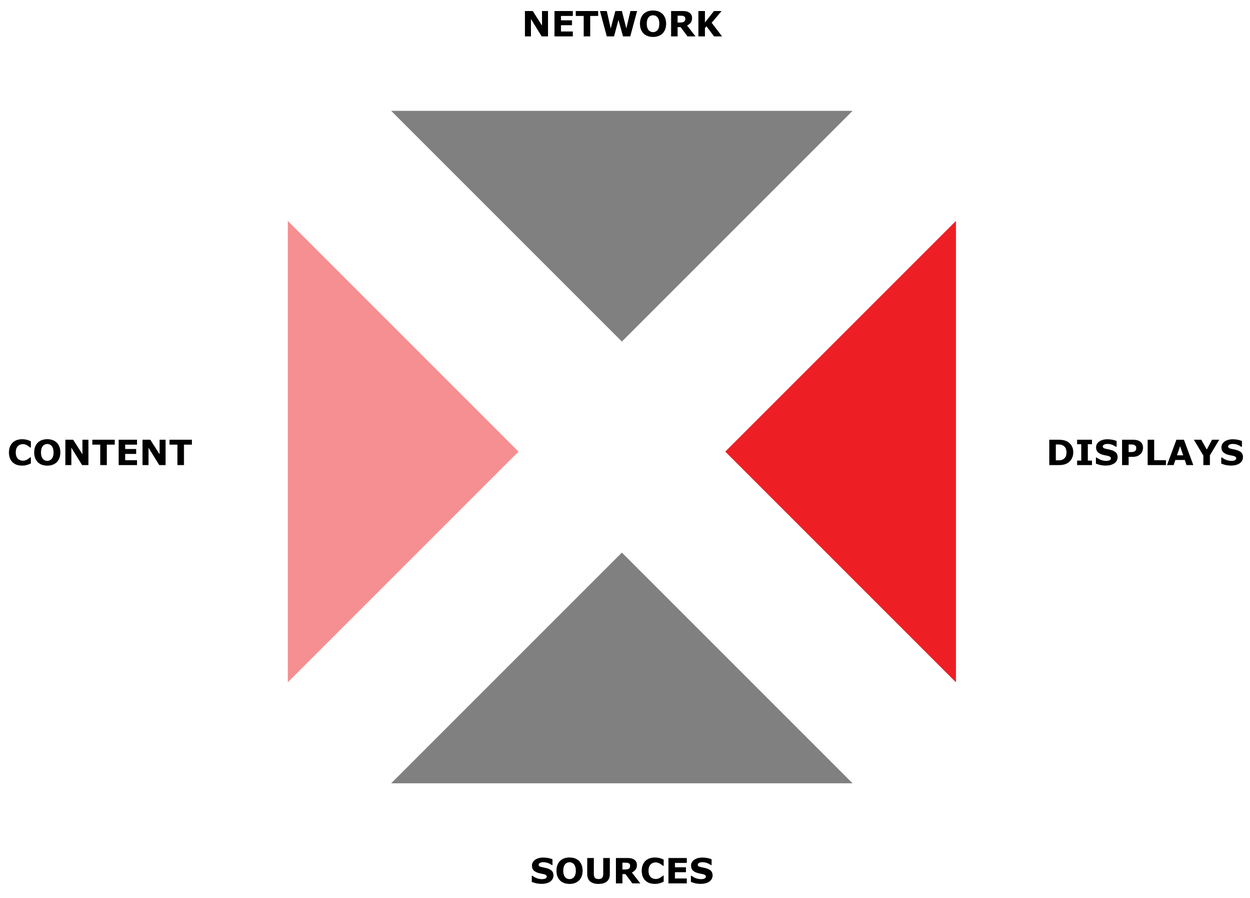
- **I don't have the time! - Then Read the HDBaseT PDFs:**
  - HDBaseT Do's & Dont's and Best Practices
  - The HDBaseT Installer's Ten Cable Commandments





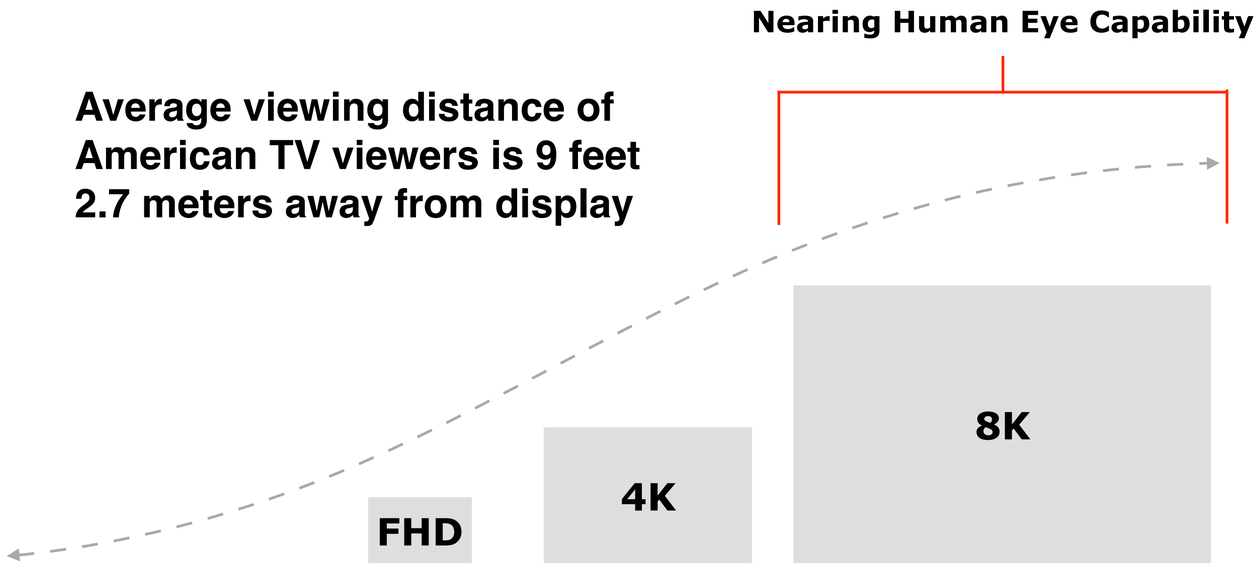
- **Use Certified Cables**

Digital Signage Architecture

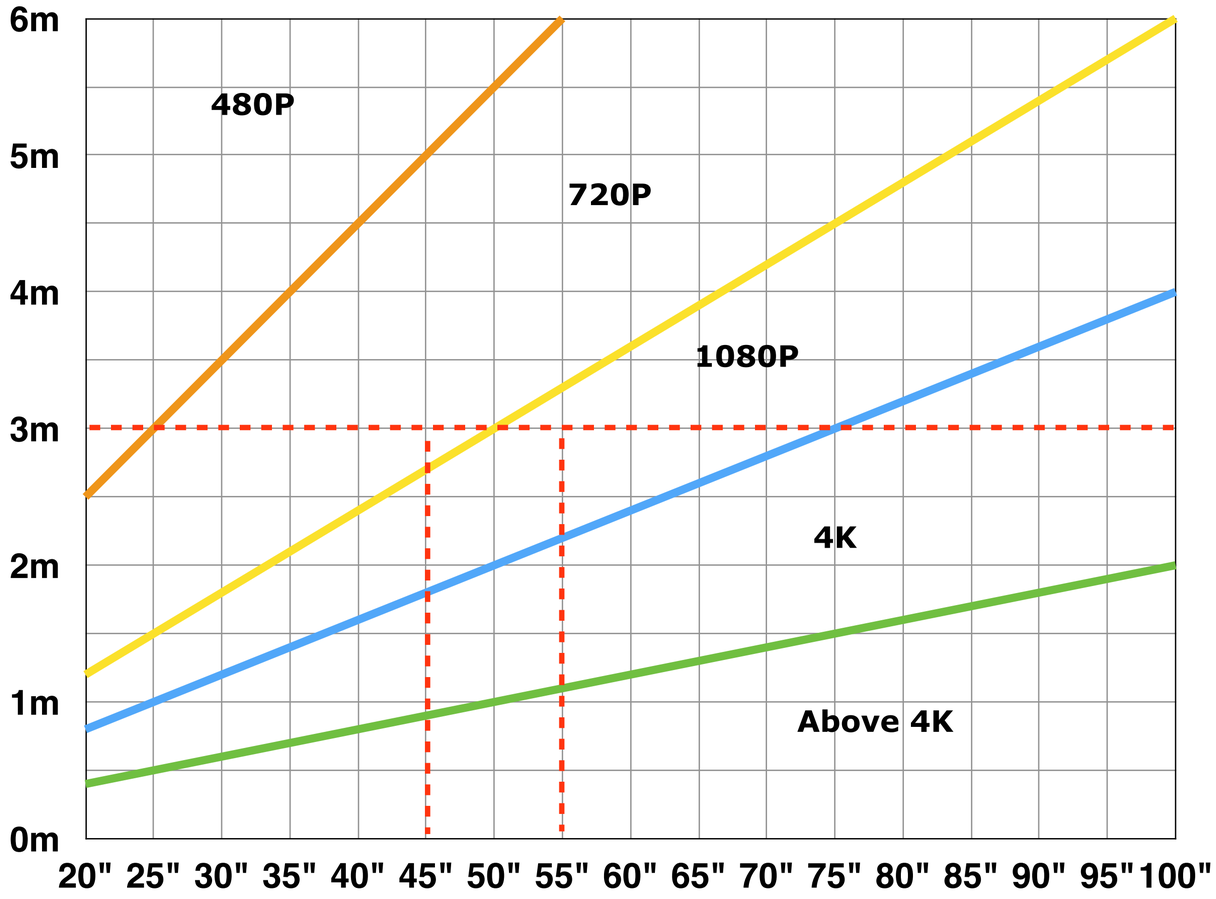


Reaching Decreasing Return on Higher Pixel Resolutions for 2D

Average viewing distance of American TV viewers is 9 feet 2.7 meters away from display



Year of Peak Popularity	2012	2018	2024
Optimal Distance to 65” Display	2.5 - 3.9m	1.2 - 2.5m	0.6 - 1.2m



Source: CarltonBale.com

There is a Clear Segmentation of Most Common Display Sizes

LED Panels

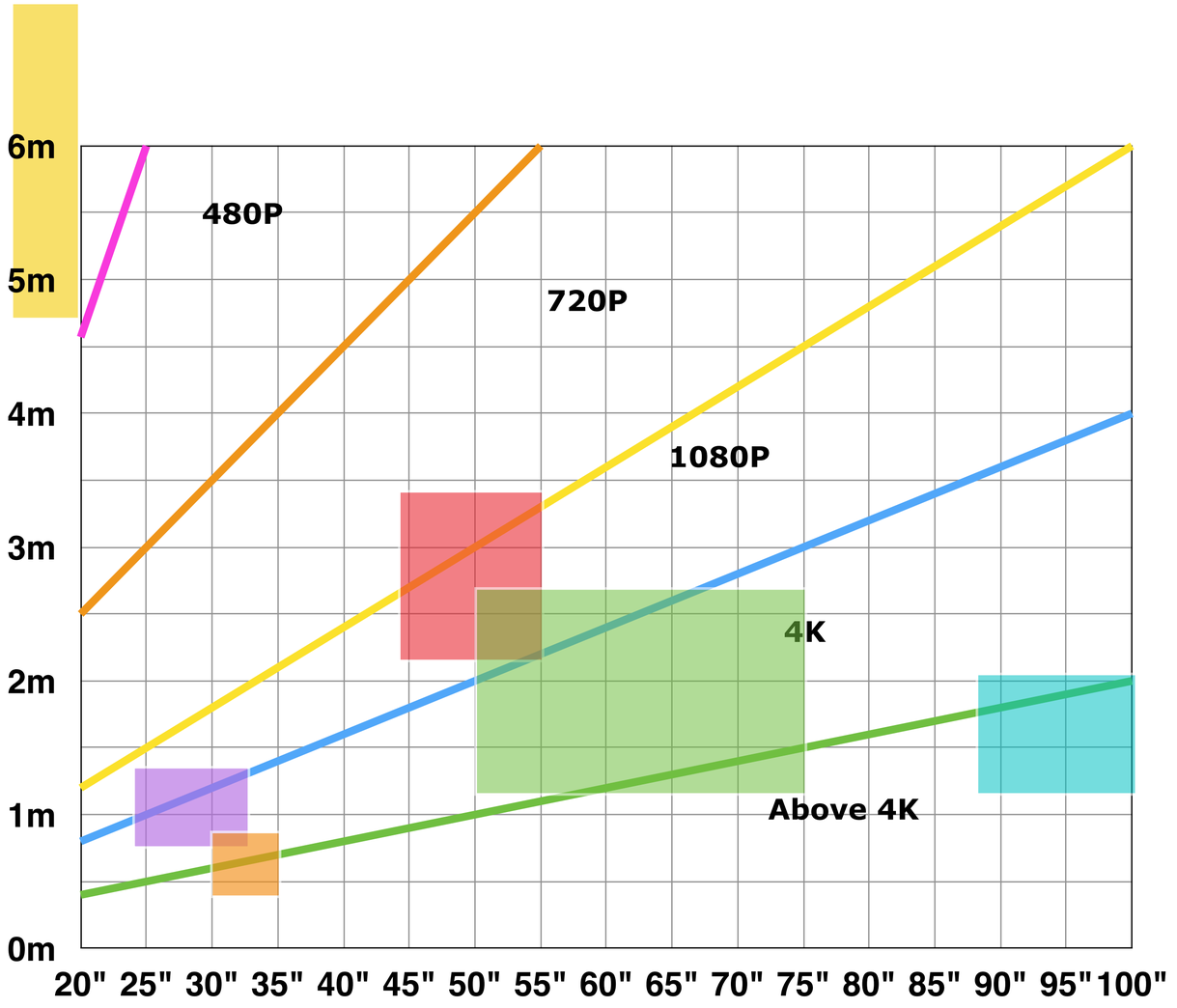
1080P Display Wall

4K Stand Alone

8K Stand Alone

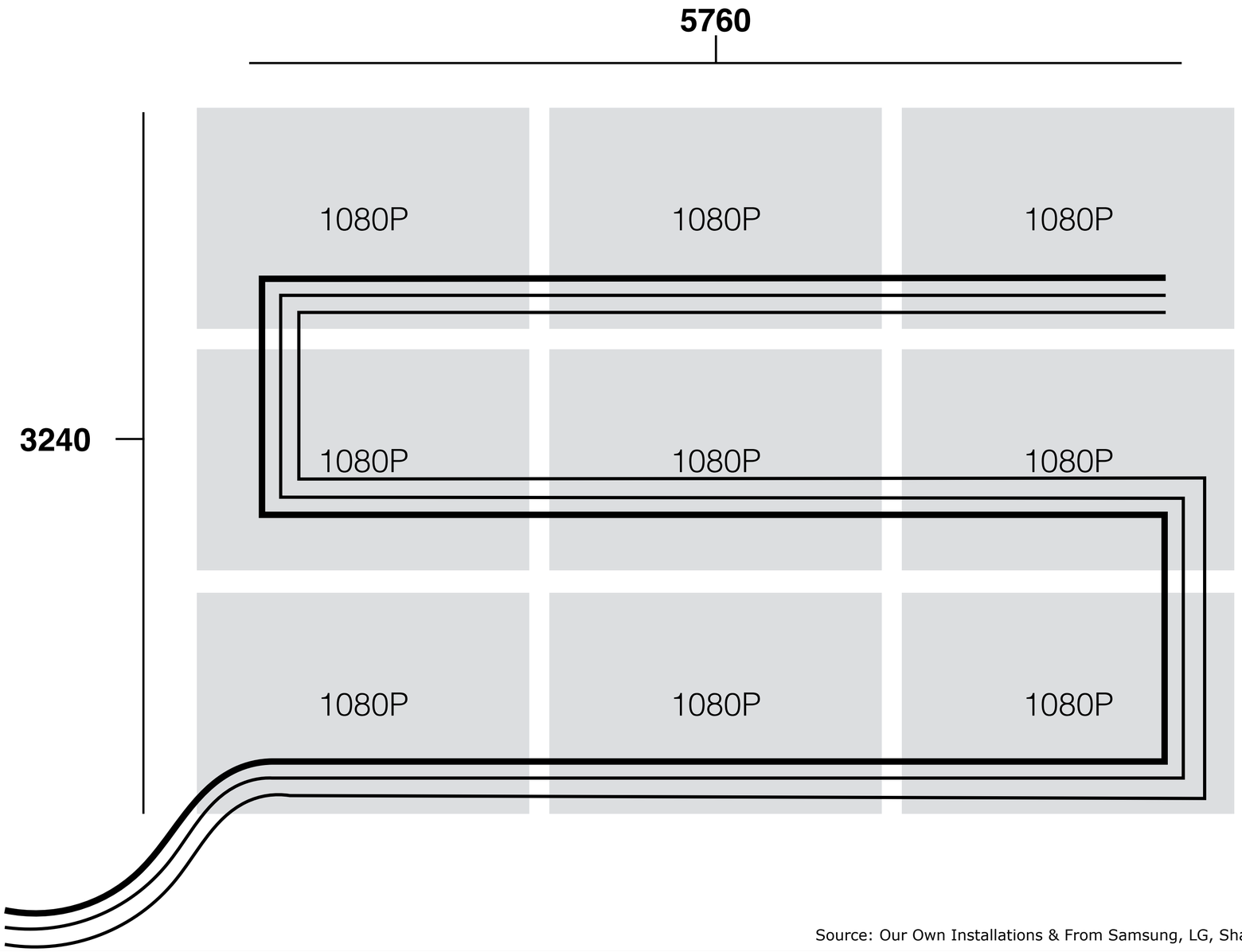
4K PC Monitors

8K PC Monitors



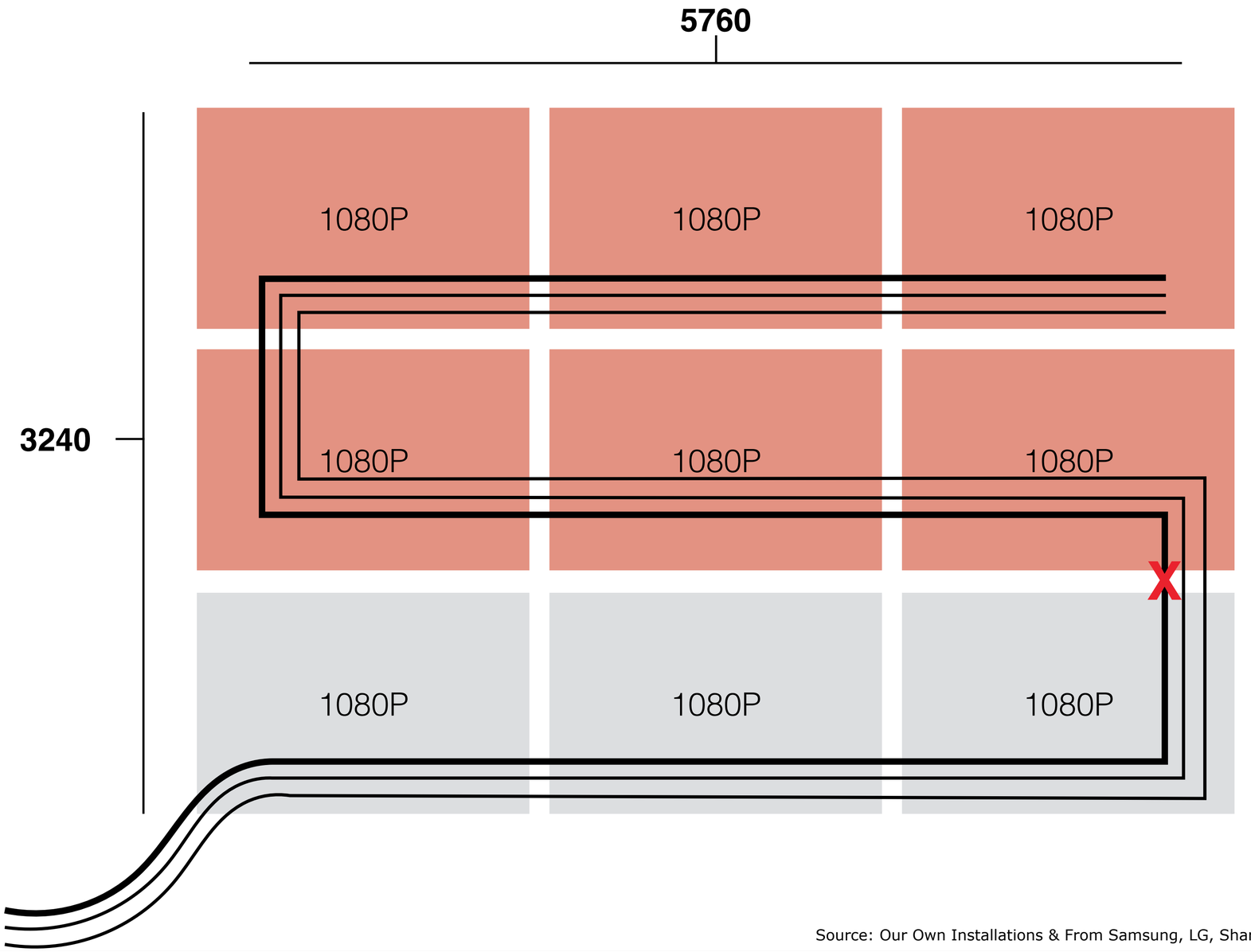
Source: Data Retrieved from Samsung, LG, Sharp, Philips, BenQ, Barco and Christie Commercial Websites

Daisychaining was Implemented to Simplify Installations but Limits Resolution



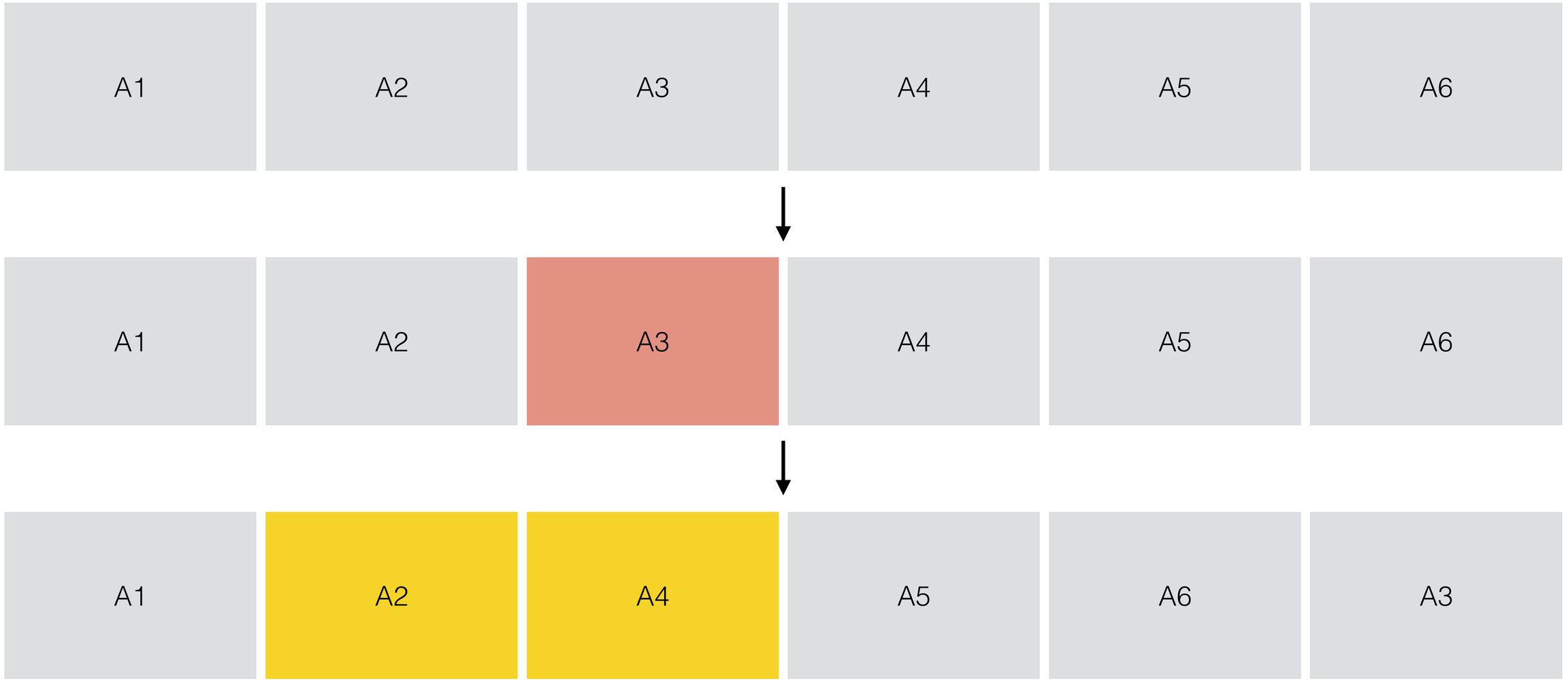
Source: Our Own Installations & From Samsung, LG, Sharp, Philips, BenQ, Barco and Christie Websites & Youtube

Daisychaining Implemented to Simplify Installations but Increases Failure Rate

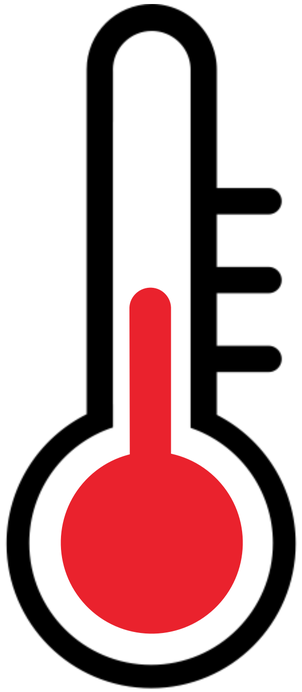


Source: Our Own Installations & From Samsung, LG, Sharp, Philips, BenQ, Barco and Christie Websites & Youtube

Screen Order Preservation and EDID Management is a Challenge



Poor Thermal Management by End-Nodes in the Network

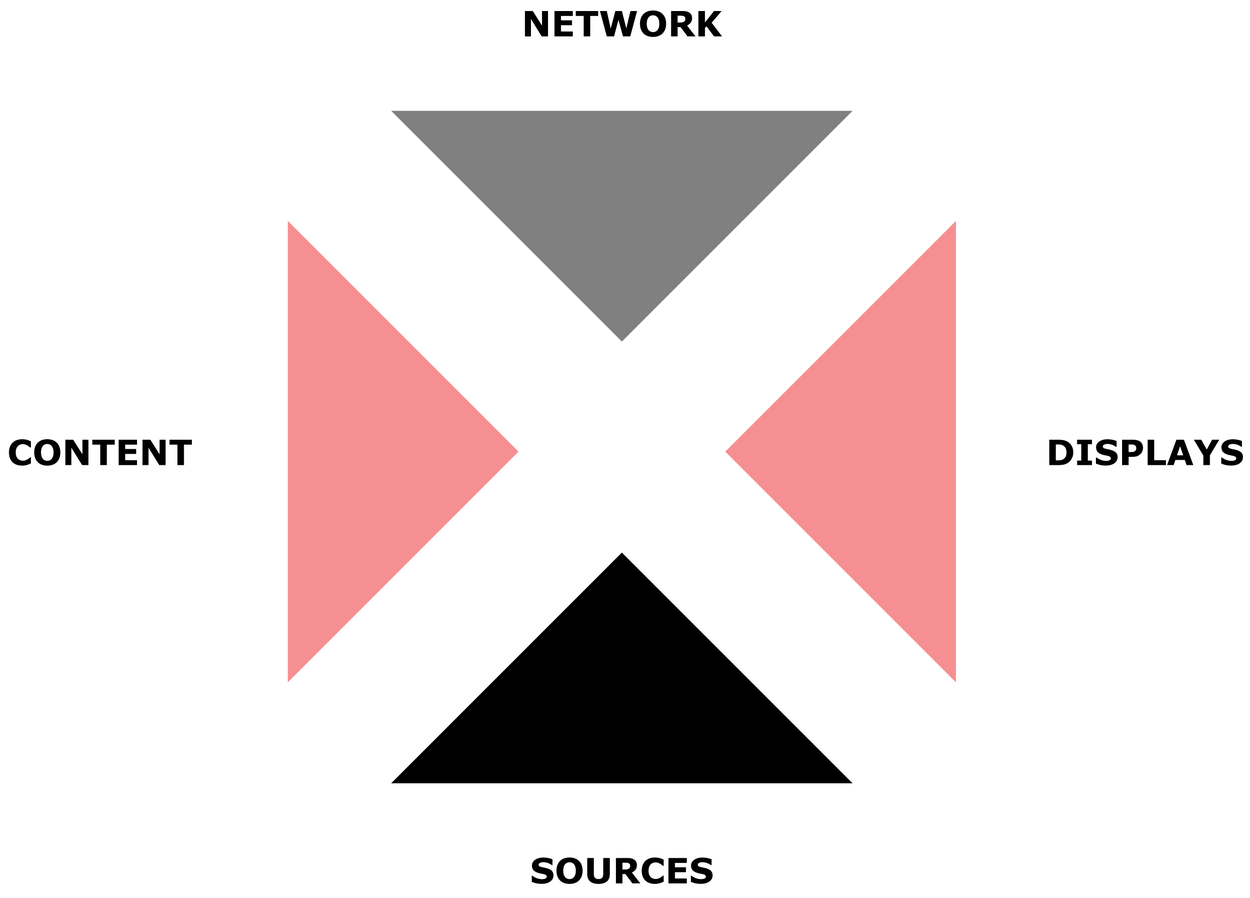


Thermal Shut Down

Backlight Burn Out

General Heat Wear on electronics

Digital Signage Architecture



Very Few HDBaseT Sources to allow for point-to-point installations

Common Audiovisual Sources

Declining Sales

Raw Source

Computers
GPU/CPU video Source

Thousands of Certified HDBaseT Products, but only 3 Certified HDBaseT Sources*

oppo

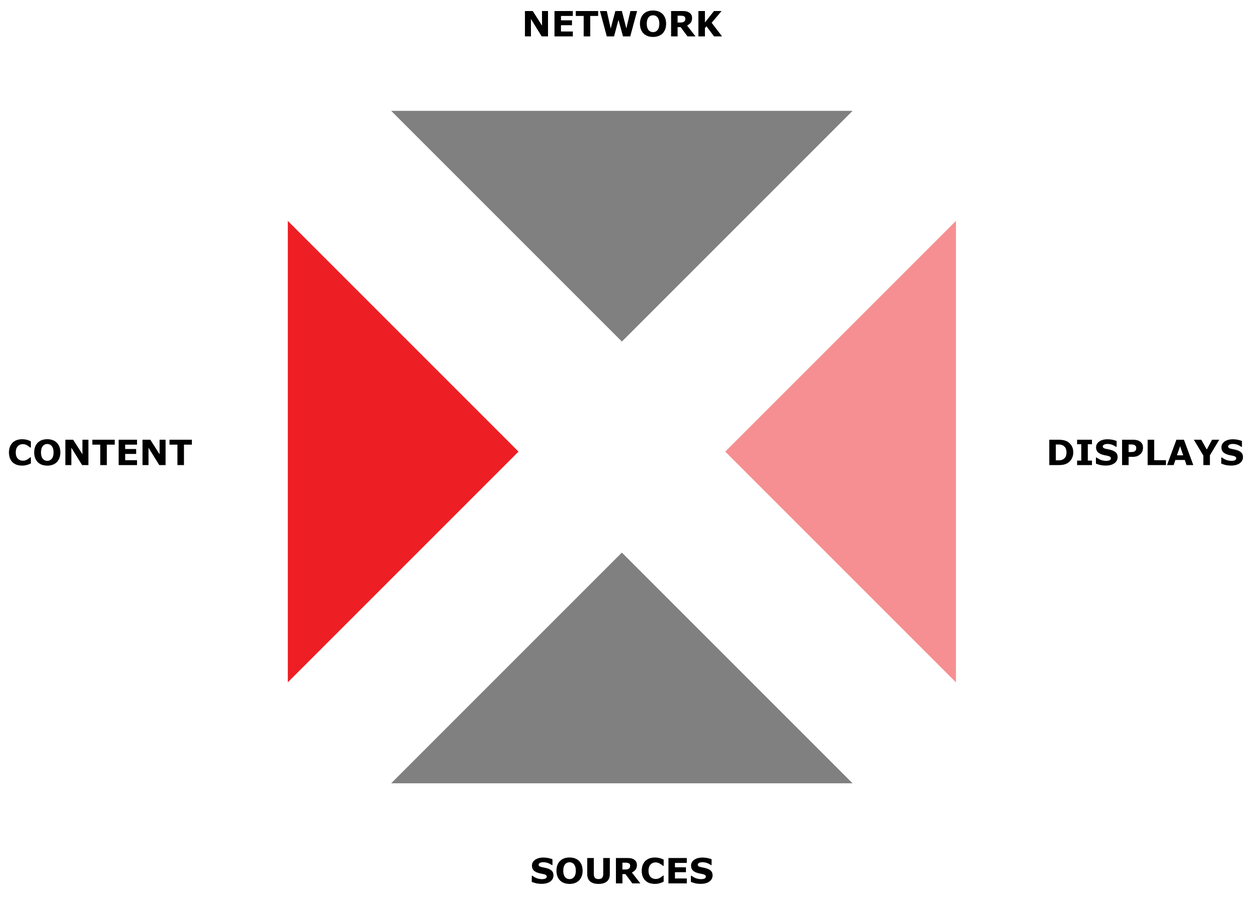
AJA VIDEO SYSTEMS

SIGMATEK

Result: System Integrators forced to use extenders and switches increasing complexity with **extremely** few true point to point installations

***Not anymore ;)**

Digital Signage Architecture



RAW Uncompressed 4K is Currently a Near Impossibility for Digital Signage

Video Resolution	Frame Rate	Chroma Information	Color Depth	HDMI	Data rate (Gbps)	Data rate GBps	120 Minute Video Storage (GB)	Download Time (Minutes)
4K UHD	60	4:4:4	12	2.1	26.73	~3.34	24,048 GB or ~24TB	~3m 5d 2h
4K UHD	60	4:2:2	12	2.0	17.82	~2.23	16,056 GB or ~16TB	~2m 4d 9h
4K UHD	60	4:2:0	12	2.0	13.36	~1.67	12,024 GB or ~12TB	~1m 16d 13h
4K UHD	30	4:4:4	12	2.0	13.36	~1.67	12,024 GB or ~12TB	~1m 16d 13h
4K UHD	30	4:2:2	12	1.4	8.91	~1.11	7,920 GB or ~7.9TB	~1m 7h

Source: Fastest Average (2017) Internet Speed = S. Korea 28.553 Mbps https://www.akamai.com/us/en/about/our-thinking/state-of-the-internet-report/state-of-the-internet-connectivity-visualization.jsp
extron bandwidth calculator

It is Difficult to Escape Compression & DSC Does Not Reduce the Perceived Quality

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4K UHD	30	4:2:2	12	1.4	8.91	~1.11	7,920 GB or ~7.9TB	~1m 7h

Currently Not Feasible
Therefore Compression needed

Visually lossless 2:1 / 3:1 compression ratio

Source: Fastest Average (2017) Internet Speed = S. Korea 28.553 Mbps https://www.akamai.com/us/en/about/our-thinking/state-of-the-internet-report/state-of-the-internet-connectivity-visualization.jsp
extron bandwidth calculator

Nearly all 4K Content is heavily compressed

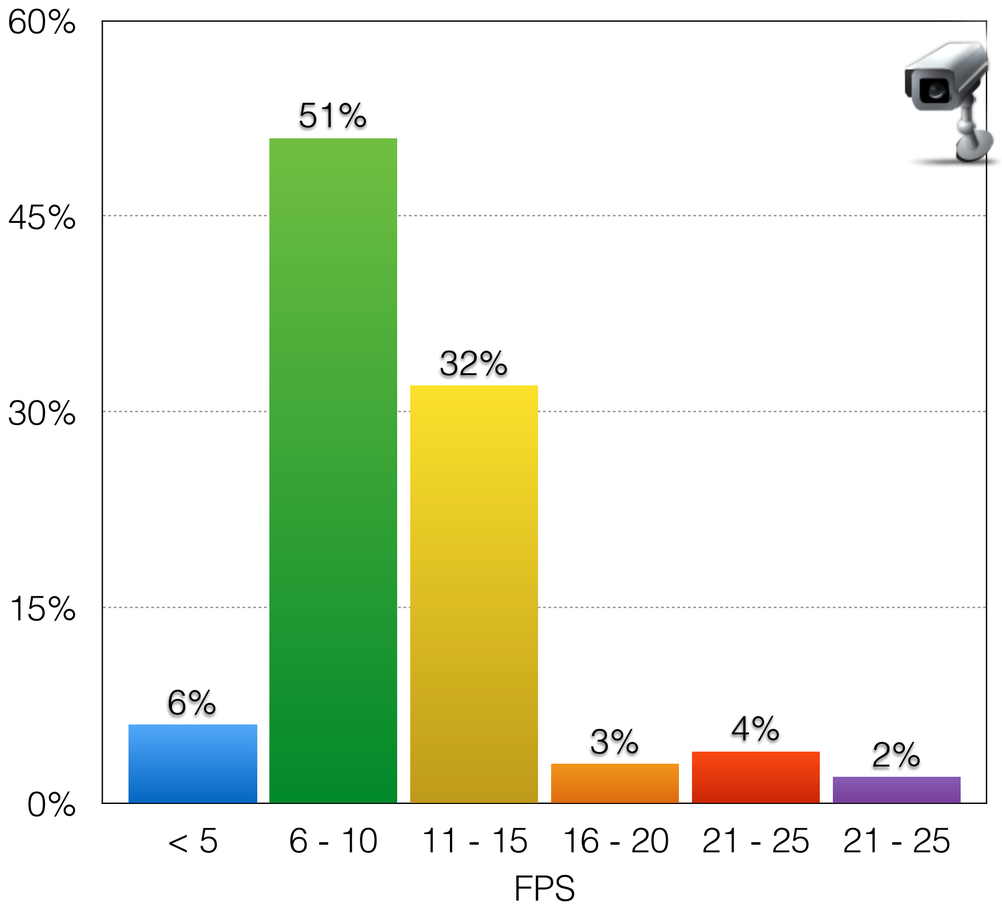
Video Type	Resolution
Non-Cinematic Broadcast TV	1080i / 720P / 1080P
Apple TV 4K (HEVC compression H.265)	4K 10-20 Mbps
Youtube 4K (VP9 compression)	4K 10-23 Mbps
Netflix 4K	4K 10-20 Mbps
Hollywood (Digital Intermediate) - Upscaling	2K to 4K
UHD Blu Ray (No 3D support)	4K AV at ~48-128 Mbps
3D Movies / IMAX 3D - Upscaling	2K

Source: http://www.etsi.org/deliver/etsi_ts/101100_101199/101154/01.11.01_60/ts_101154v011101p.pdf#page=19
Internal tracking of data rate

30 FPS is Good Enough for Majority of Digital Signage Installations

Video Type	Frame Per Second
NTSC / DVB	29.97
PAL / DVB	25
Motion Picture Film / IMAX	24
Security Cameras	1-30
IMAX HD & 3D	48
Gaming	30-*60*-120
PC use	30-60

IPVM.com 5547 cameras 150 cameras 4K or above, 34 (30 FPS) 0 cameras above 30 FPS @ 4K



- Average Frame Rate Usage, Integrator Jan 2016 IPVM.com

Source: IPVM.com data retrieved Jan 2017

Key Take Aways from Today's Presentation

- **Use the Zachman's Framework to plan your digital signage installation**

- **Network**
- Carefully Consider Security for you Digital Signage installations (Now more than ever!)
- Know the points of Failure in your system, and eliminate as many as possible
- Always use HDBaseT Certified Cables and treat them like gold

- **Displays**
- Be aware of marketing gimmicks, learn the technical facts about resolution, size and viewing distance
- Be aware of the pitfalls of daisy chaining
- Deploy measures to ensure screen order preservation (EDID Management)
- Carefully consider thermal management and where your equipment will be installed

- **Sources**
- The industry has moved from physical medium (tapes and discs) to PC as a main source, but industry has not caught up - having to use extenders.

- **Content**
- 4K60 Do not fear, DSC is here - but does your application really require it?

advoli

INTRODUCING

World's First: Advoli's HDBaseT Certified Graphics Card Family

1080 FULL HD 60

70M

Standard

1080 FULL HD 60

150M

Distance

4K 30 ULTRA HD

100M

Performance

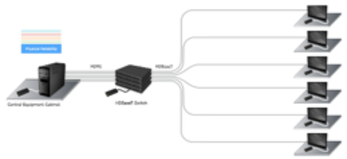
TA6/TB6 Family of Video Cards

- World's first Modular and 6 Channel HDBaseT Certified Video Card.
- Delivers Audio and Up to 4K UHD resolution video over 100 meters, FHD up to 150 meters.
- Emulated Controls (IR, RS232, CEC)
- Pass Through Controls (IR)
- 3D Sync
- 6 Independent channels
- Utilises MXM 3.1 Standard and MXM Graphics Cards
- Half-length card using standard PCIe x16 slot

advoli Allows for True Point-to-point Installations

Remember the alternatives?

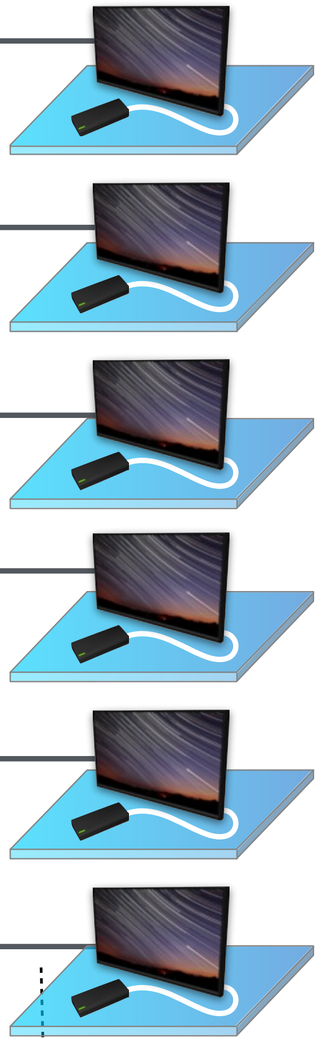
42-54 Physical Points of Failure Power Installation Issues



14-15 Physical Points of Failure

Central Equipment Cabinet

4K 100M Cat 6 Cable



6 Physical Points of Failure

advoli Delivers Reduction in Cost, Complexity and Points of Failure

Competitors

Video Card

x1

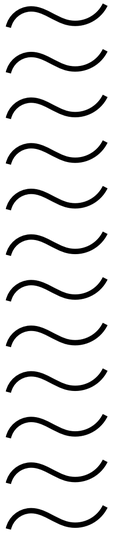
Power Adapter

x12

HDBaseT Tx/Rx

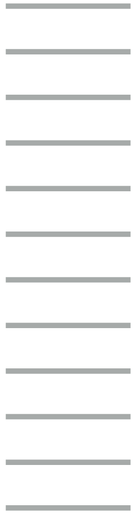
x12

Power Cable



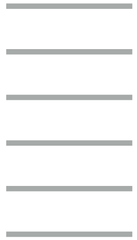
x12

HDMI Cable



x12

CAT Cable



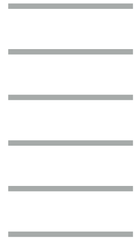
x6

advoli

Video Card

x1

CAT Cable



x6

Competitive Advantage Summary

Disruptive

Significantly alter the way A/V companies operate

Lowers Cost

Lowering the number of devices and points of failures of up to 90%

Easier Installation

The benefits of CAT cables, with additional features making installation easier

Disruptive Technology

Modular

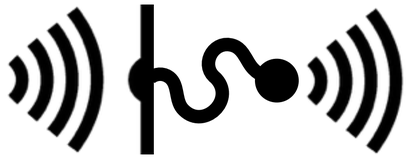
Modular graphics card that is capable of using both Type A or Type B MXM 3.0/3.1

Emulated Controls

World’s first graphics card to have emulated controls allowing IOT solutions

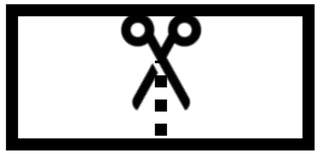
Diagnostics

Built in HDBaseT diagnostics and environmental censors on transmitters and receivers to monitor performance



Pass Through IR

World’s first graphics card with pass through IR

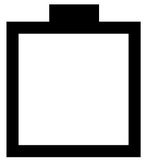


Half length

Half-length card that can fit mini-ITX form factor motherboards

HDBaseT

World’s first HDBaseT Certified graphics card and compatible with other HDBaset Products



Smallest Rx Dongle

World’s first and smallest HDBaseT receiver dongle

Lowers Cost

No Electricians

No electricians needed for additional power installation as only media player and displays need to be powered

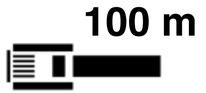
Device Reduction

Reduces number of devices and cables between the player and display from a high of 54, to a low of 6 (~90% reduction)

Less Points of Failure

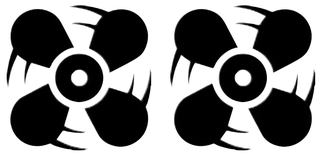
Less points of failure - meaning lower servicing cost

And remote diagnostics



CAT cable benefit

CAT cables are relatively cheap and allow for longer distances than other copper based cabling



Dual Fan

Dual fan for redundancy using double bearing for longer life span to decrease failure rate and overheating

Easier Installations

Flexible & Light Weight

CAT cables have higher flexibility and lower weight compared to HDMI and DisplayPort cables

Long Distance

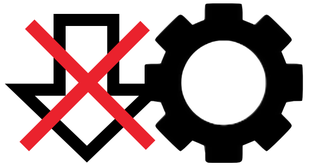
CAT cables allow for long distances (150m @ FHD) and termination on site

Fire-proof & Shielded

Fire-proof and shielded CAT cables are abundant

Plug & Play

Plug and play installation

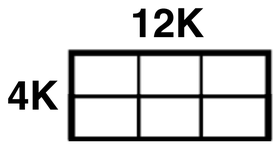


No Custom Drivers

No custom drivers needed

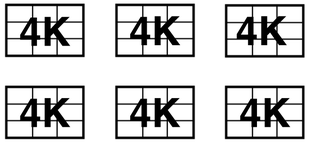
Screen Order Preservation

Screen order preservation



Enormous Resolution

Enormous 6 x 4K resolution



6 Display Walls

Can drive 6 display walls each with unique 4K content from 100m distance per hop

Competitive Advantage Summary

Disruptive

Significantly alter the way A/V companies operate

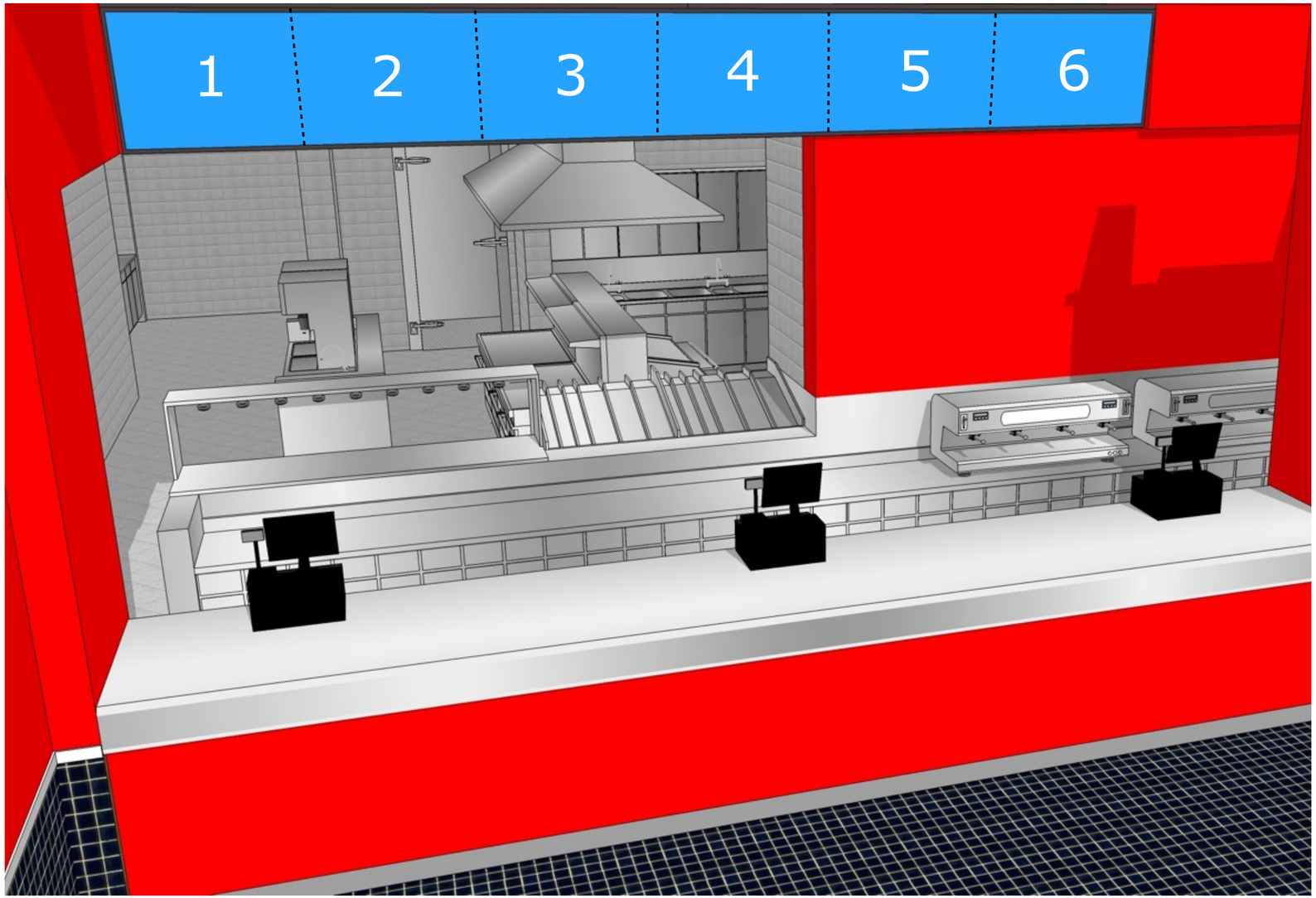
Lowers Cost

Lowering the number of devices and points of failures of up to 90%

Easier Installation

The benefits of CAT cables, with additional features making installation easier

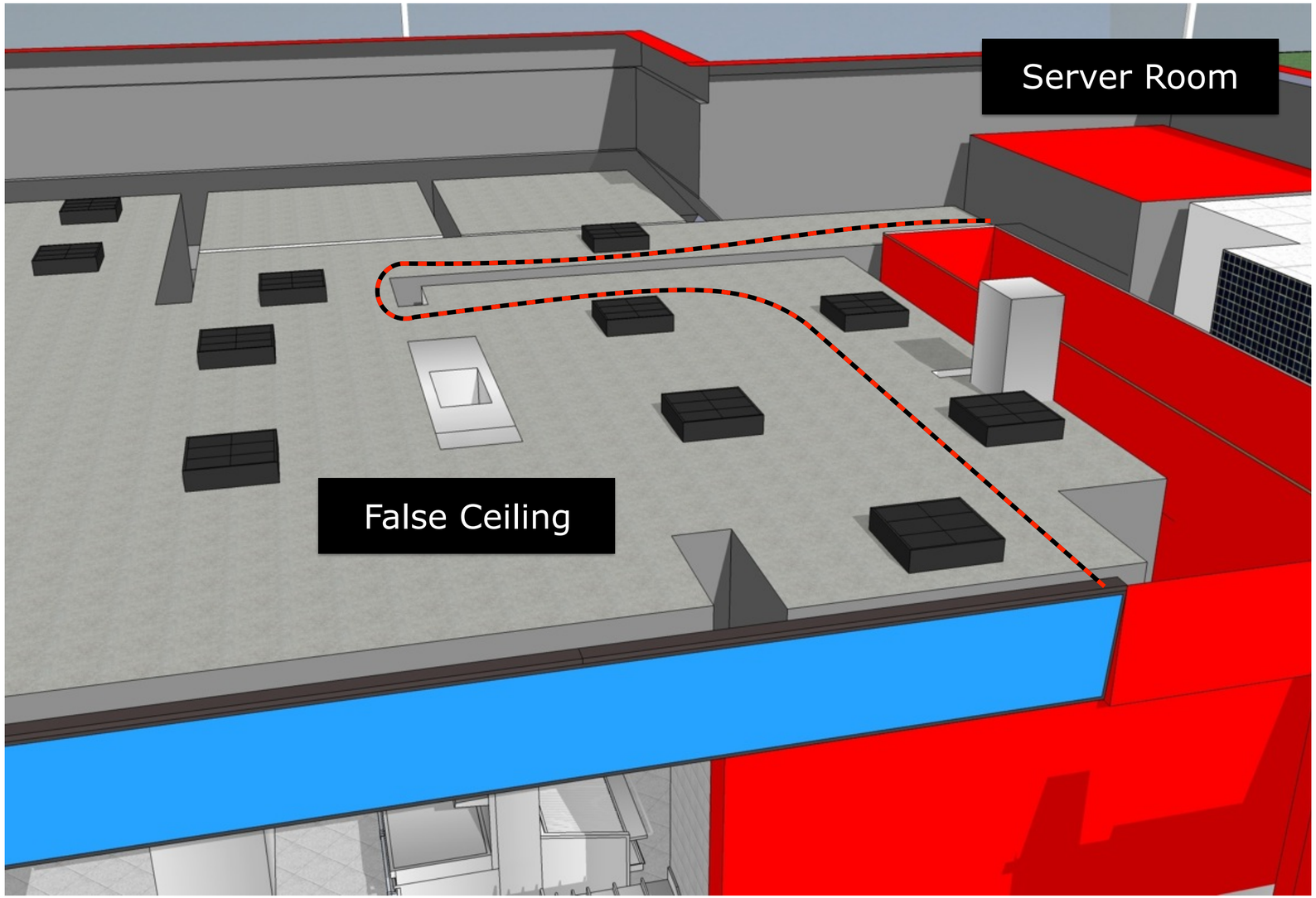
Quick Service Restaurants & Convenience Stores: Menu Boards



- Digital Menu Boards most common display configurations 4-6
- Located above heat generating devices: friers, heat lamps etc… leading to high failure rates in displays
- Distributed installations with no local IT manager = frequent servicing by SI for low level tasks
- Distance > 3 meters from viewer = 1080P is more than enough. (not considering kiosks)
- Primarily only 2 Play needed: video and controls.

Model Source: Cordelle

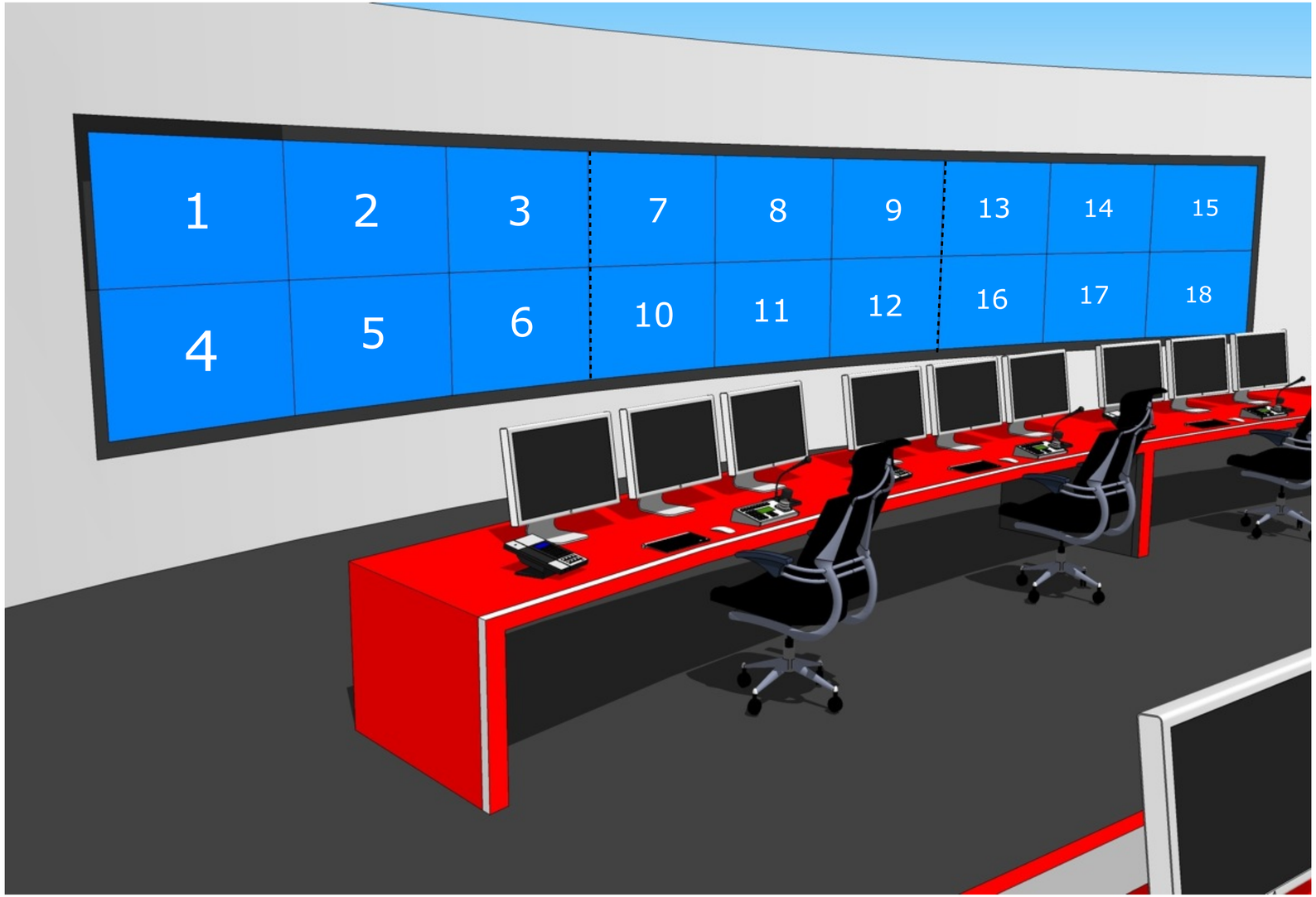
Quick Service Restaurants



- Frequent use of false ceilings:
  - Need light weight & low bend radius cables
  - Need fire resistant cables
  - Need cables that can go longer distances, usually > 20m, and < 70 meters
  - Need less cables (one cable per display)
  - Need cables that are more difficult to accidentally unplug
- Need sources that are easily and quickly serviceable, but secure
- Remove extenders and their power adapters
- Avoid electricians for additional power outlets due to cost
- Ideally have a plug and play point to point system to m inimize installation time
- Easy hardware diagnosis to reduce visits

Model Source: Cordelle

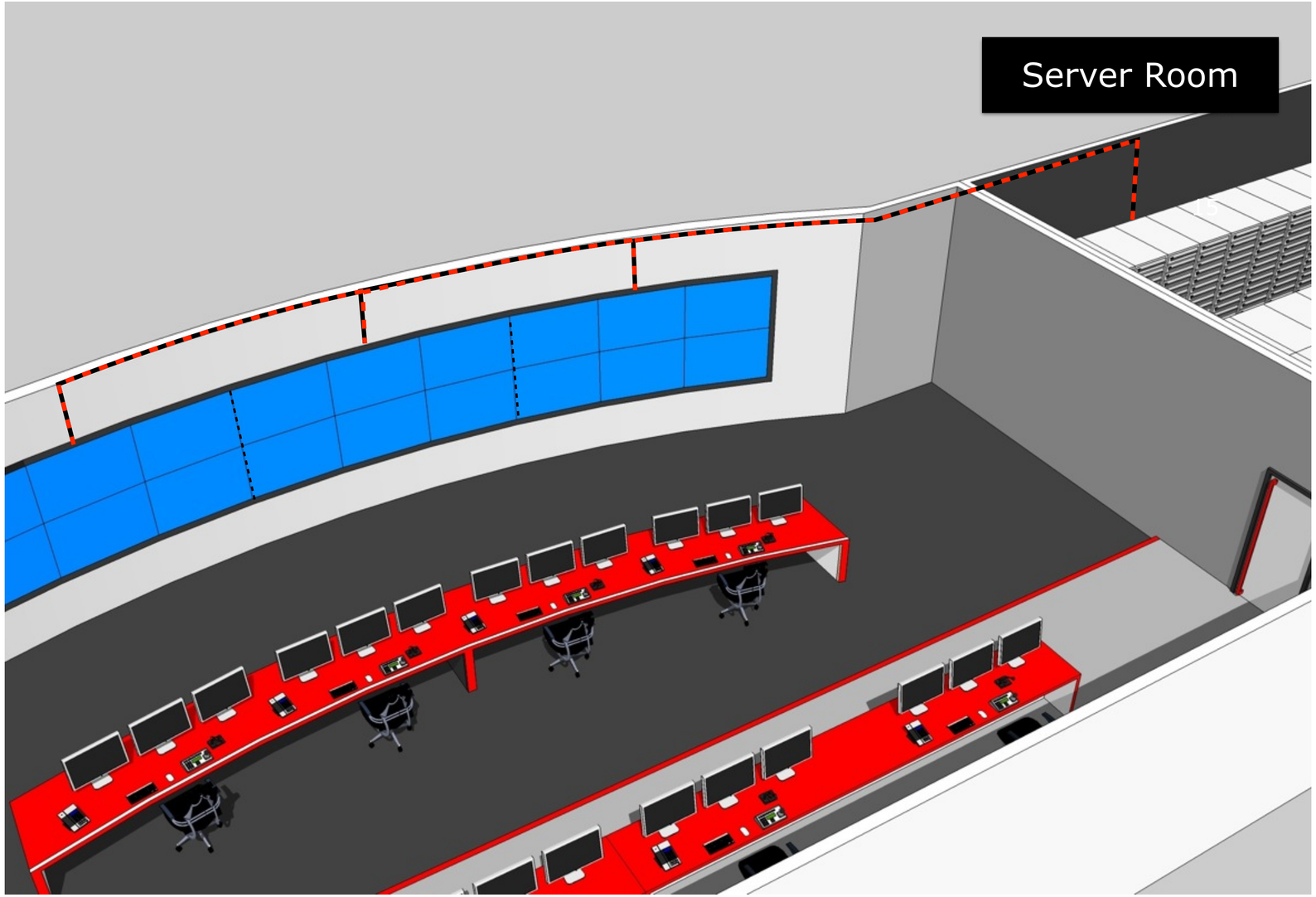
Control Room - Display Walls



- One display or cable should not take down a chain of displays.
- Displays should use their true full resolution
- Displays should be hot pluggable
- Displays should not jumble arrangement when replaced
- Security of connection between server and display is important
- 98% of Surveillance footage < 25 FPS
- Distance > 3 meters from viewer = 1080P is more than enough if video is not scaled to multiple displays.
- Primarily only 2 Play needed on display side: video and controls.

Model Source: STUFF & STUFF

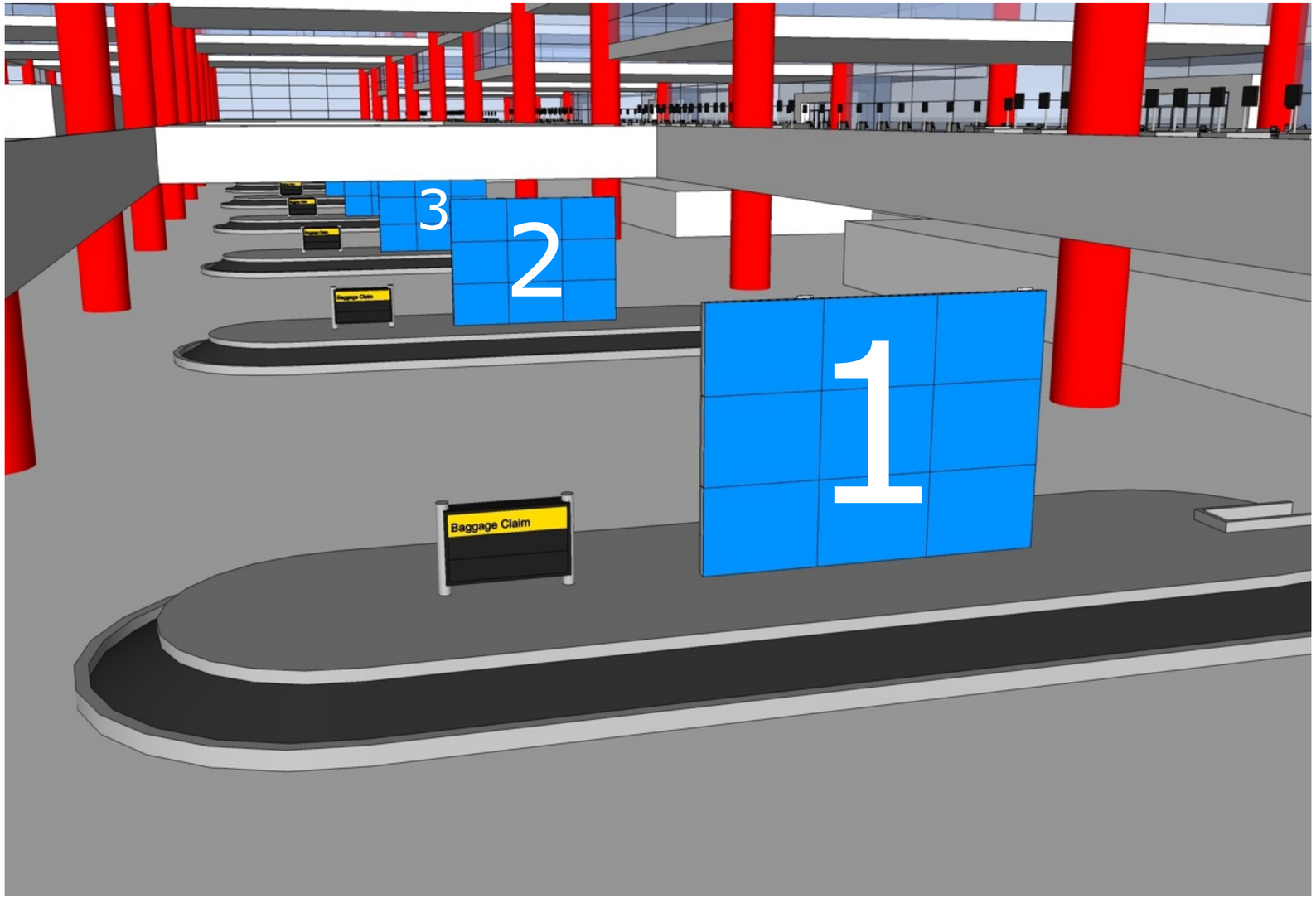
Control Room - Display Walls



- Frequent use of false ceilings:
  - Need light weight & low bend radius cables
  - Need fire resistant cables
  - Need cables that can go longer distances, usually > 50m, and < 150 meters
  - Need less cables (one cable per display)
  - Need cables that are more difficult to accidentally unplug
  - Need cables that are more difficult to accidentally unplug
  - Need cables to detect disconnections
- Need sources that are easily and quickly serviceable, but secure
- Avoid electricians for additional power outlets due to cost, use own IT engineer
- Minimize installation time and visits by engineers to reduce cost and down time
- Ideally have a plug and play point to point system

Model Source: STUFF & STUFF & Desinger 5000

4K Display Walls for Advertising



- Daisy Chaining is more acceptable
- Audience is usually > 3 meters away, but image is scaled across many displays usually 3x3 or 4x4 justifying UHD resolution
- Remote diagnostic of audiovisual signals is important
- 30 FPS is good enough for advertising
- Primarily only 2 Play needed on display side: video and controls
- Need longer reach up to 100 meters for UHD content

Model Source: Edward Patrick B.

HDBT™

Alliance Webinar

Thank you for participating