

# Pruebas de la infraestructura del centro de datos: métodos prácticos para cableado de cobre y fibra óptica

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**Softing**





**SATRA**

optimize!

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- TESTING THE BACKBONE
  - OF THE DATA CENTER:  
PRACTICAL METHODS FOR  
COPPER AND FIBER

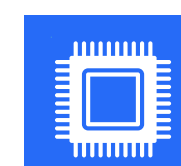
# AGENDA



**Introduction to Data center testing**



**Fiber optic testing basics VFL through OLTS and OTDR**



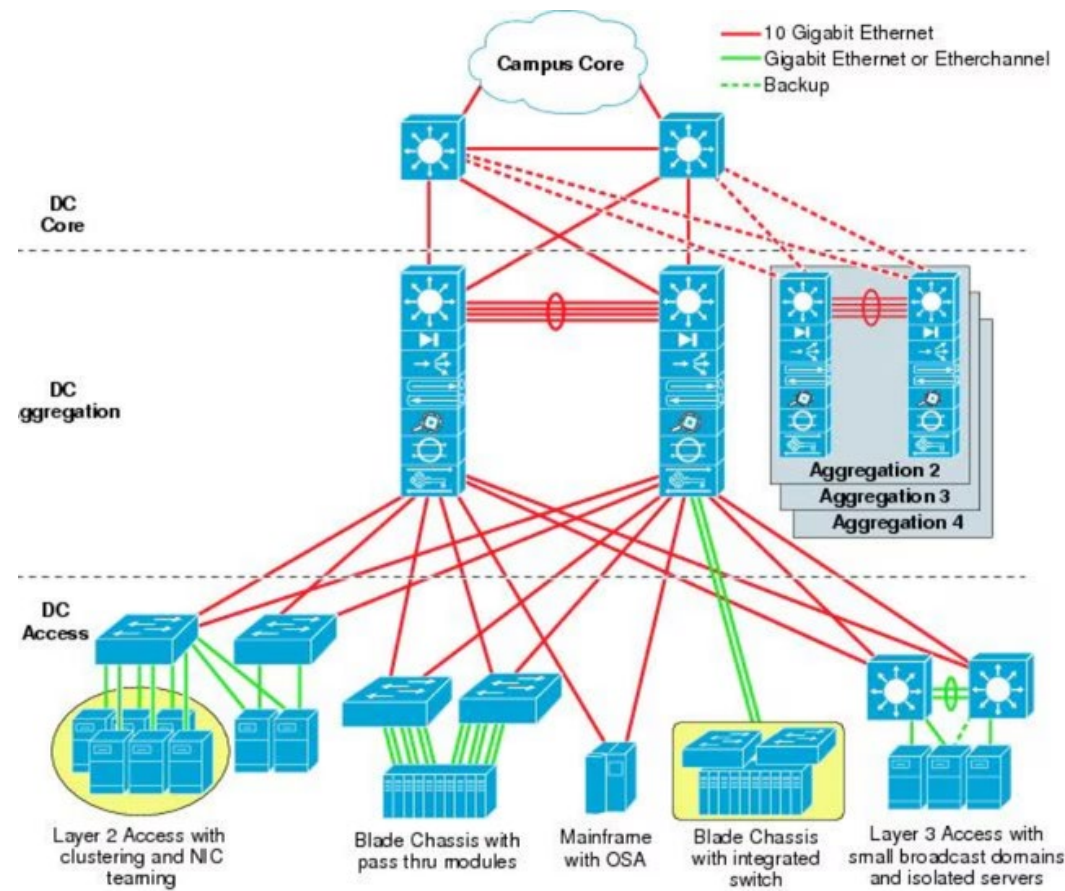
**Copper cable testing : up to CAT 8 and POE DC resistance**



**Networking Side: switch ports and Ping**



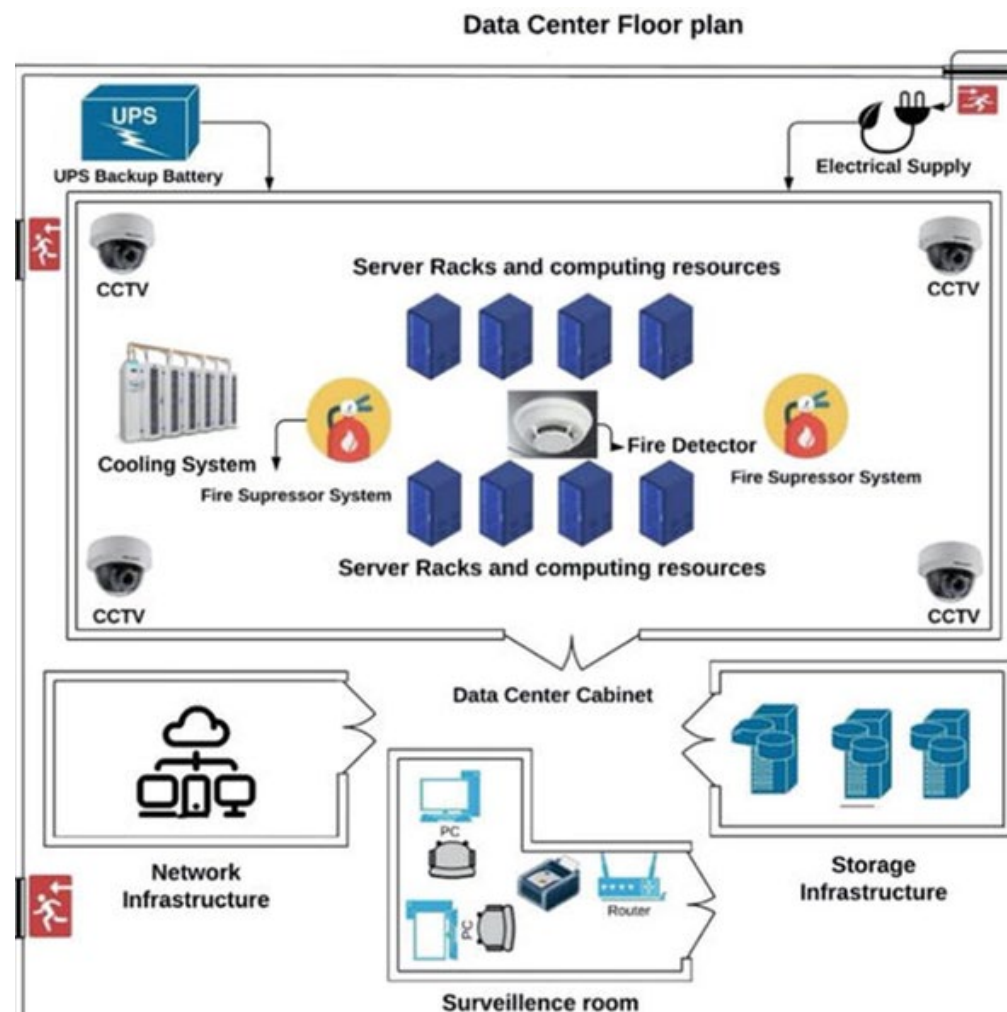
**Best practices and conclusion**



# COMMON DATA CENTER ARCHITECTURES

- Traditional
- Modern design
- Edge data center design

Data center architecture also includes the security and operational needs of the facility



# WHY TEST IN DATA CENTERS ?

•Ensures reliability for mission critical apps

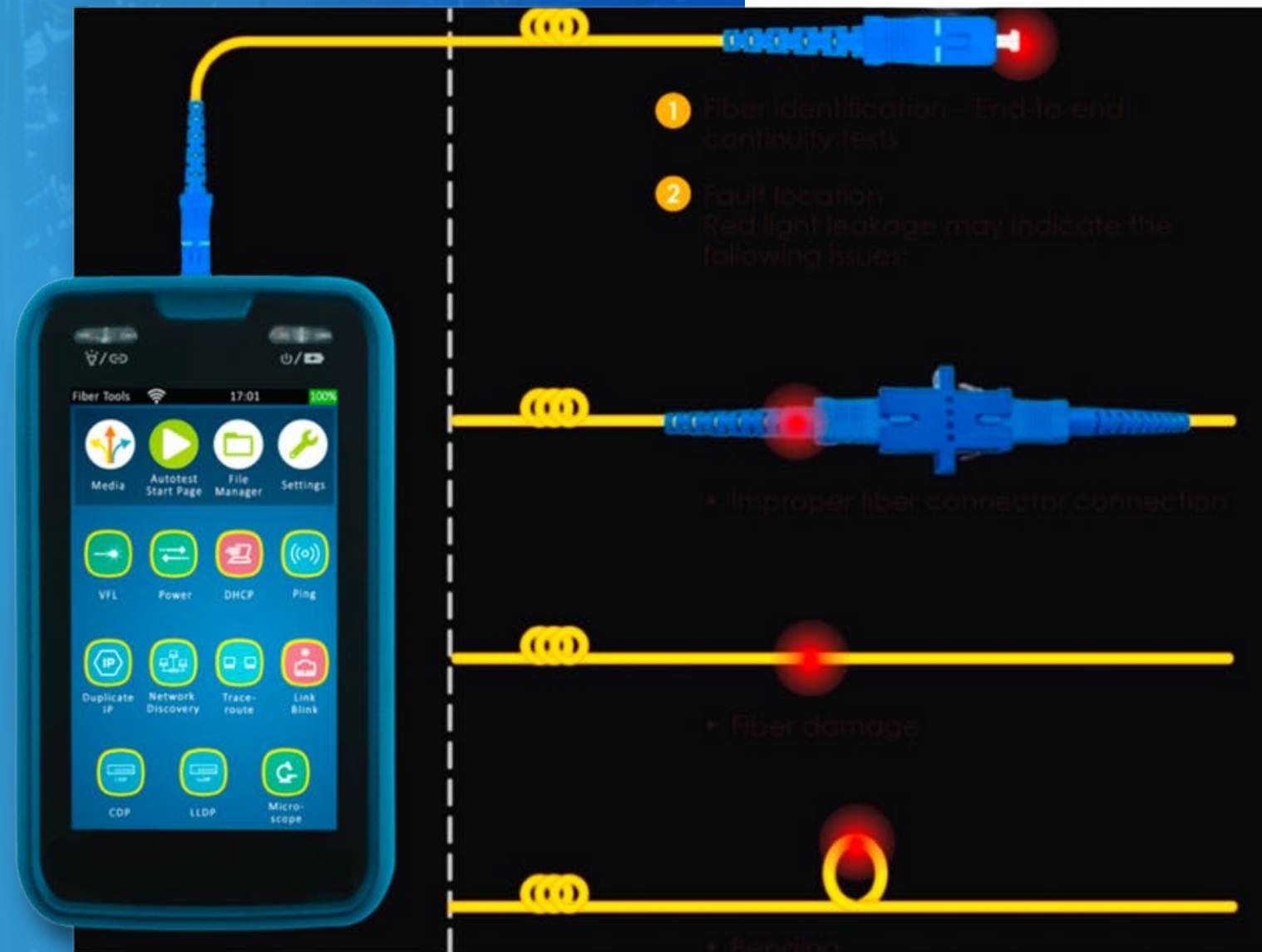
•Supports high speed networks 10g - 400g +

•Compliance with TIA 942 TIA 568 ISO IEC  
11801

•Prevents downtime and verifies Poe  
compatibility

# FIBER OPTIC TESTING OVERVIEW

- Backbone for high bandwidth, low latency links
- Progressive approach: Visual(VFL) > qualify with rough loss > quantitative (OLTS)
- Troubleshoot links with OTDR
- Tier 1 per TIA 568.3-D & ISO / IEC 14763-3 (loss, polarity, length of pair)

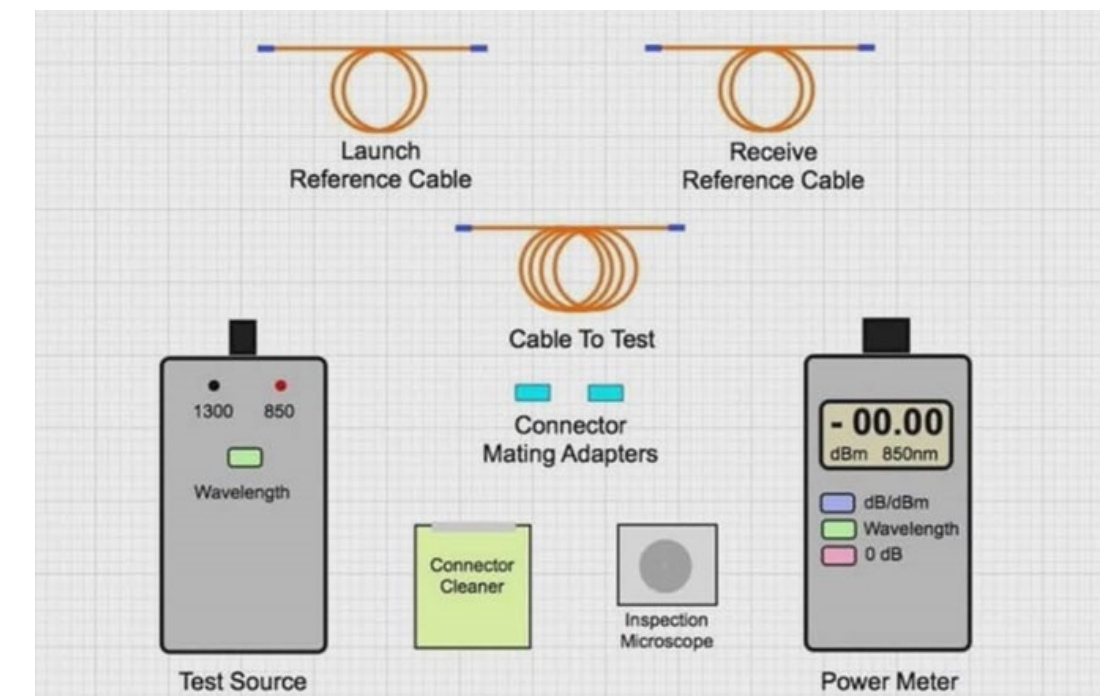


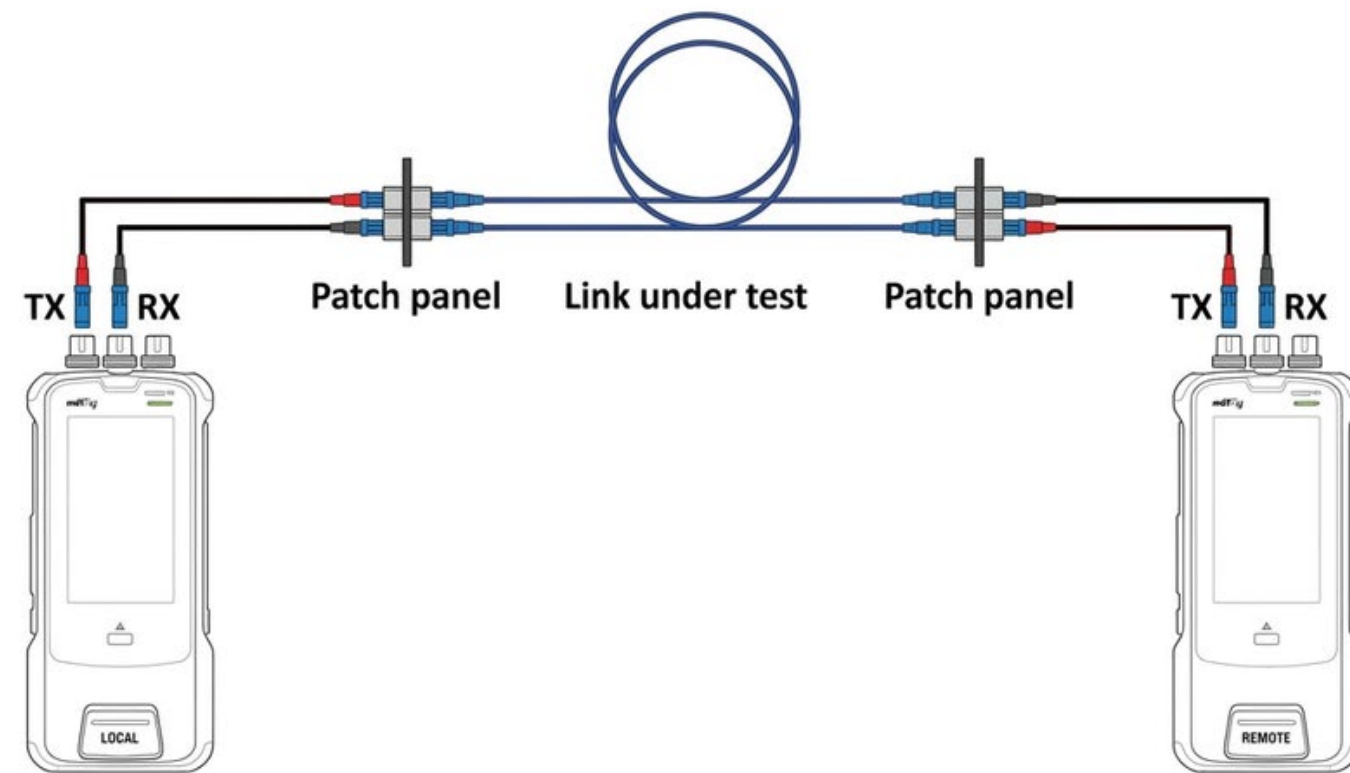
# SIMPLE VFL TESTING FOR FIBER

- Visual fault locator injects 650nm red laser output less than 1mw
- Checks continuity, polarity, and locates breaks, macrobends, bad splices
- Procedure: clean connectors > connect VFL> trace cable > spot leaks
- Quick, low cost first step check
- Eye safety; never view light directly and use safety rated tools

# QUICK LINK LOSS QUALIFICATION

- Quick test for absolute loss
- No reference
- No setup
- No length measurement





*Uni-directional Dual-end*

## OLTS TESTING OF FIBER PAIRS

- Optical Loss Test Set measures insertion loss (dB), length and polarity
- Bidirectional testing for accuracy (duplex pairs)
- Light source and power meter setup
- Set Reference > Measure Link > Record results
- Required for Tier 1 Certification

### Bi-Directional Testing

01-08-23 3:05

A-5  
TIA-468.2 ISP  
OS1  
SMF  
Next link: A-6

203.28 m

1310 nm 0.35 dB >

1550 nm 0.52 dB >

Reference Data >

+ Update IMG  
Delete IMG

01-08-23 3:05

A-3  
TIA-568.3 ISP  
OS1  
SMF  
Next link: A-6

203.28 m

1310 nm	Fiber-BA	Fiber-BA
Loss-LR (dB)	0.52	0.63
Loss-RL (dB)	0.53	0.65
Limit (dB)	1.00	1.00
Margin (dB)	0.47	0.35

01-08-23 3:05

A-3  
TIA-568.3 ISP  
OS1  
SMF  
Next link: A-6

203.28 m

1550 nm	Fiber-BA	Fiber-BA
Loss-LR (dB)	0.48	0.45
Loss-RL (dB)	0.48	0.46
Limit (dB)	1.00	1.00
Margin (dB)	0.52	0.54

*Dual-ended Autotest      Singlemode 1310nm      Singlemode 1550nm*

01-08-23 3:05

A-3  
TIA-568.3 ISP  
OS1  
SMF  
Next link: A-4

203.77 m

1310 nm 0.64 dB >

1550 nm 0.67 dB >

Reference Data >

+ Update IMG  
Delete IMG

01-08-23 3:05

A-3  
TIA-568.3 ISP  
OS1  
SMF  
Next link: A-4

203.77 m

1310 nm	Fiber-BA
Loss-LR (dB)	0.00
Loss-RL (dB)	0.36
Limit (dB)	1.00
Margin (dB)	0.64

01-08-23 3:05

A-3  
TIA-568.3 ISP  
OS1  
SMF  
Next link: A-4

203.77 m

1550 nm	Fiber-BA
Loss-LR (dB)	0.00
Loss-RL (dB)	0.33
Limit (dB)	1.00
Margin (dB)	0.67

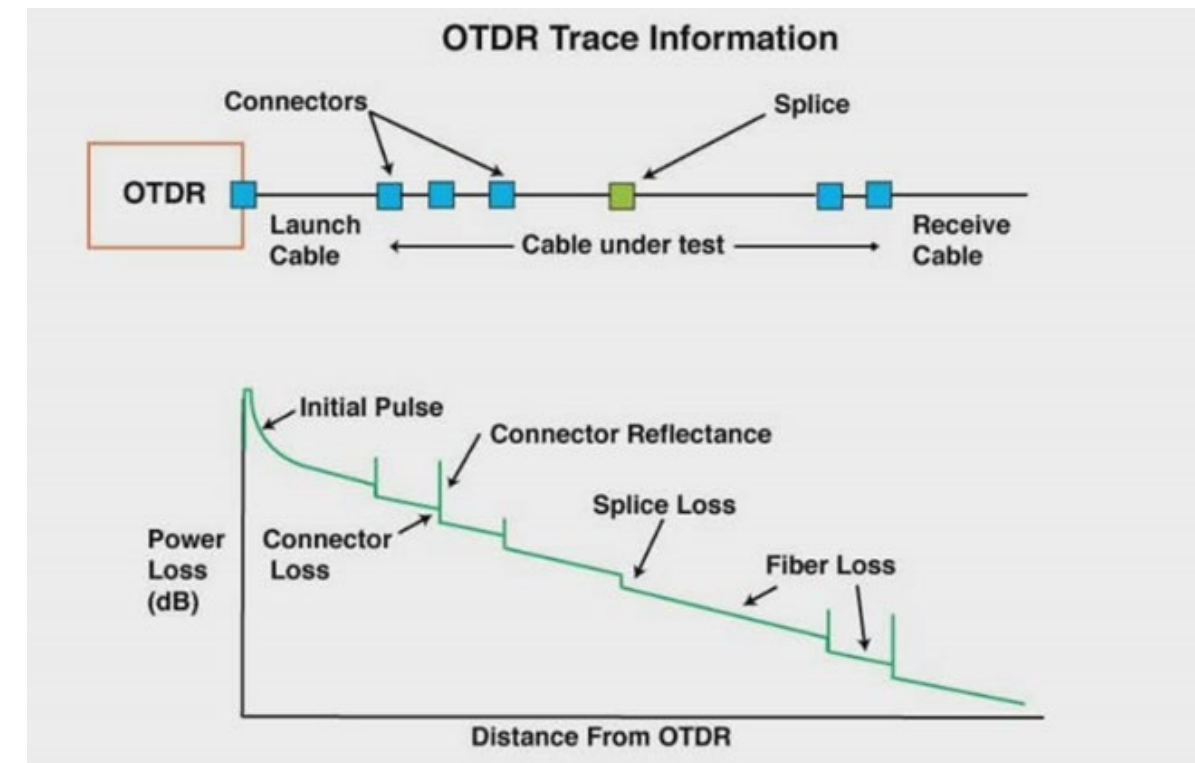
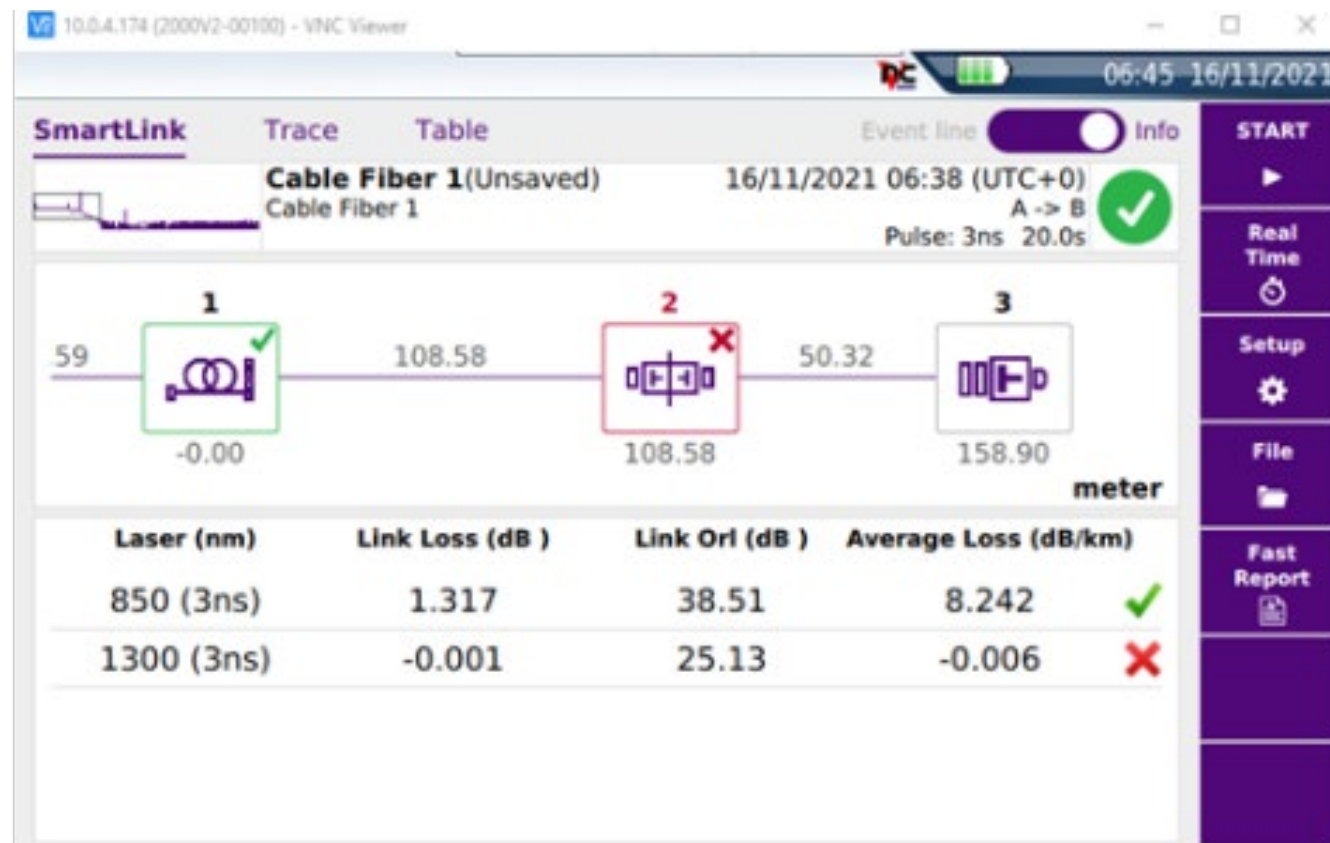
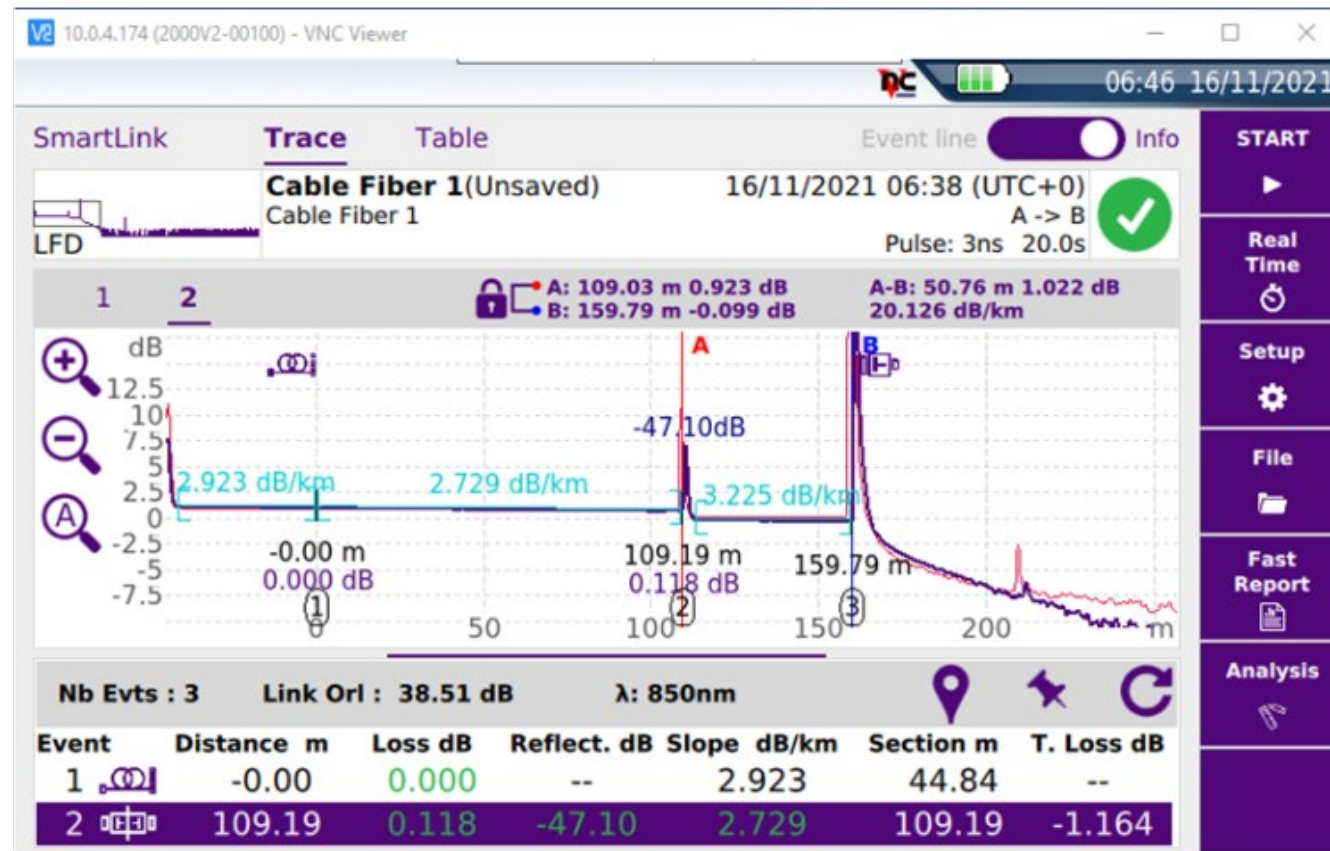
*Single-ended Autotest      Singlemode 1310nm      Singlemode 1550nm*

# FIBER TESTING TO NETWORK LIMITS

- Compare OLTS loss application specific Budgets
- Includes Connectors, Splices, cassettes, and total length
- Ensures support or Speed/ Distance (eg 10G 40G 100G)
- Pass /Fail per TIA 568.3-D and ISO standards

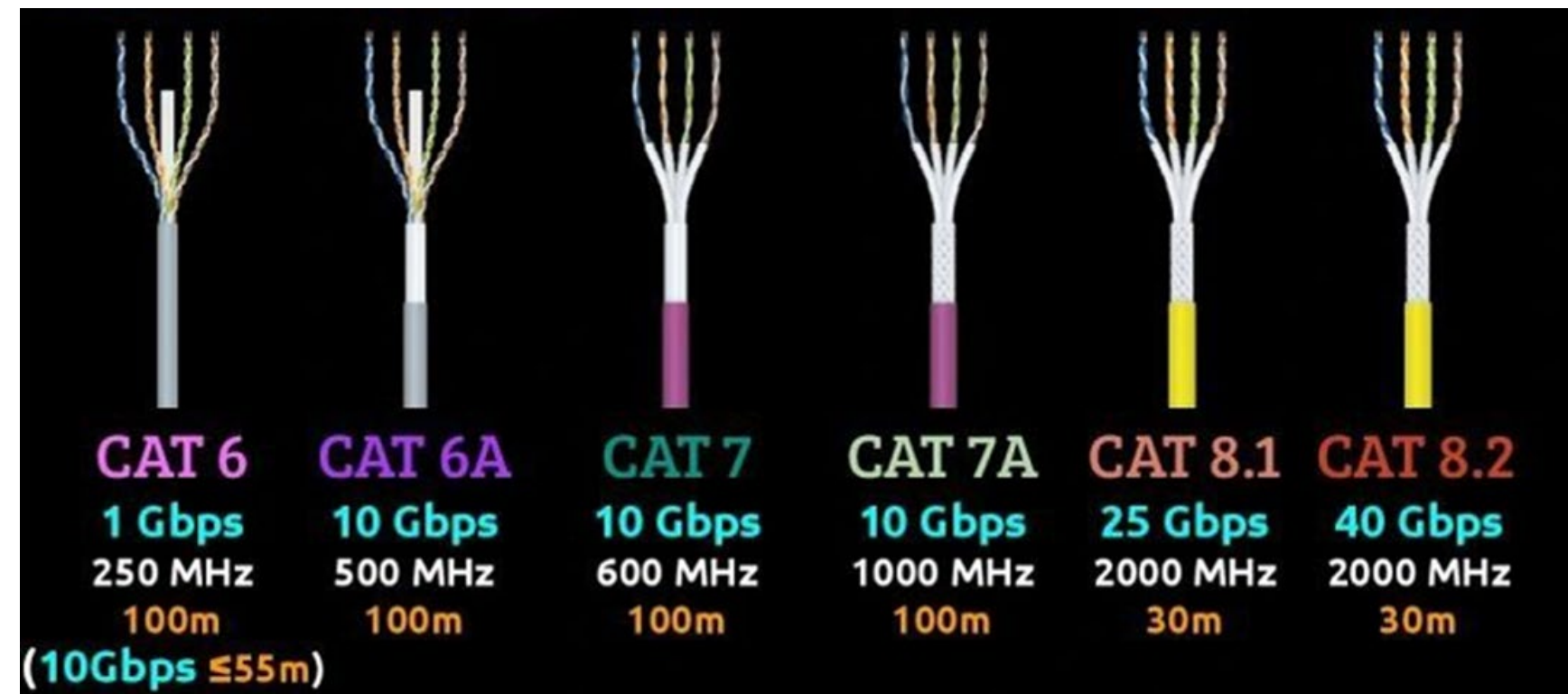
# OTDR TESTING FOR TROUBLESHOOTING FIBER LINKS

- Includes Connectors, Splices, cassettes, and total length for each strand of fiber
- Provides specific event feedback for loss reflectance and exact location on the fiber link
- Pass /Fail per TIA 568.3-D and ISO standards



# COPPER TESTING OVERVIEW

- Full performance certification beyond basic continuity
- Tests wiremap, Length, crosstalk, insertion loss and more
- Essential for horizontal cabling and Poe devices
- Up to CAT8 for 40Gb/s Ethernet (30M channels)



## ONLINE SEMINAR

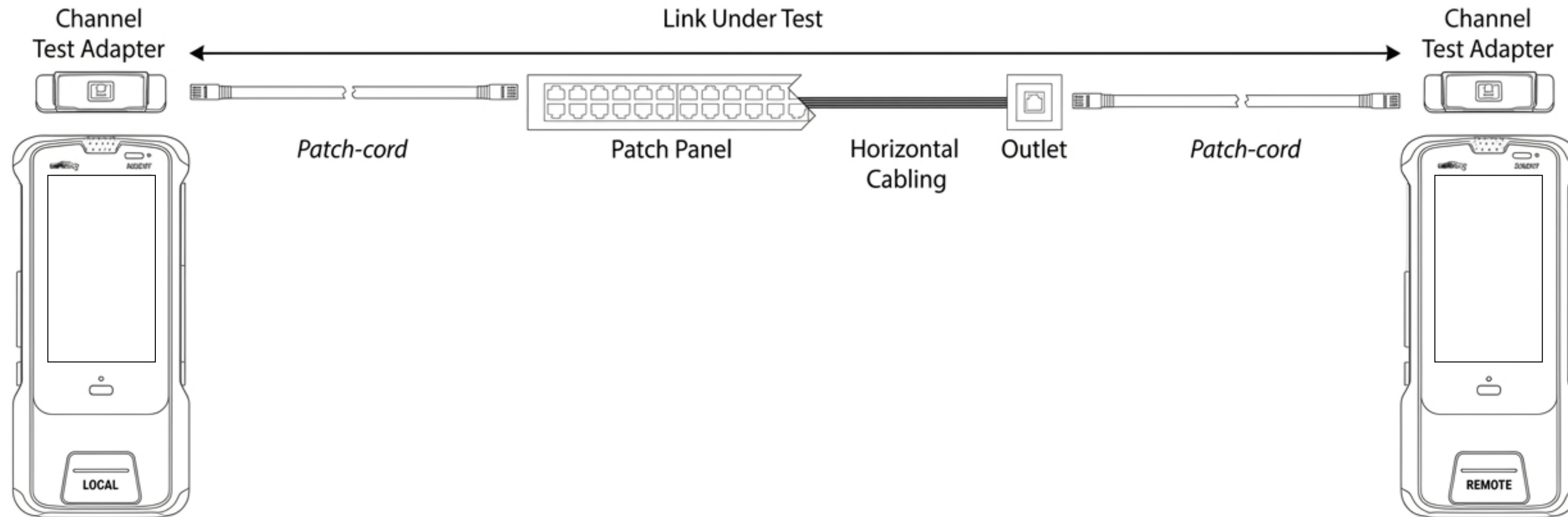
## Copper data cables

- The basis of today's copper cabling is known as the Twisted Pair cable (TP) containing 8 wires, pairwise twisted to get 4 transmission pairs with different twist factors
- Essentially, there are two types:
  - Unshielded cables (U/UTP), formerly often known simply as "UTP"



- Shielded cables (F/UTP, SF/UTP, S/FTP, U/FTP), often known simply as "STP"





# CERTIFICATION TOOL UP TO CAT 8

- Device must be modern design for CAT 8 and DCRU testing
- Full parameters :Insertion Loss, NEXT, PS-NEXT, DCRU, Return Loss, etc
- Automated Pass Fail per TIA 568.2-D and ISO/IEC Class I/II
- Fast: testing for 6A links at 8 seconds
- Deep reporting for documentation of results

09-04-25 13:03 29%

Acme cable plenum  
TIA - Cat 6 Permanent Link  
NVP: 68.0

✔ Loop   
 ✘ UBL P2P   
 ✘ UBL In Pair

Limit: 0.20,0.20,0.20,0.20,0.20,0.20 Ω

Pairs	Value	Percent
12-36	0.234 Ω	18.5 %
12-45	0.047 Ω	4.35 %
12-78	2.043 Ω	66.49 %
36-45	0.187 Ω	14.26 %
36-78	1.809 Ω	54.72 %
45-78	1.996 Ω	63.98 %

<

# DC RESISTANCE UNBALANCE FOR POE

- Critical for IEEE 802.0 af/at/bt Power over Ethernet
- Measures resistance difference within and between pairs
- Limits +/-3% or .02 Ohms (within the pair) +/-7% or 50 m Ohms (between pairs)
- Helps insure uniform and low resistance for long term POE power delivery
- Prevents power issues, heating and data distortion
- Ensures POE link performance regardless of the POE type being used on the DC application
- Built into modern certifiers but must be enabled



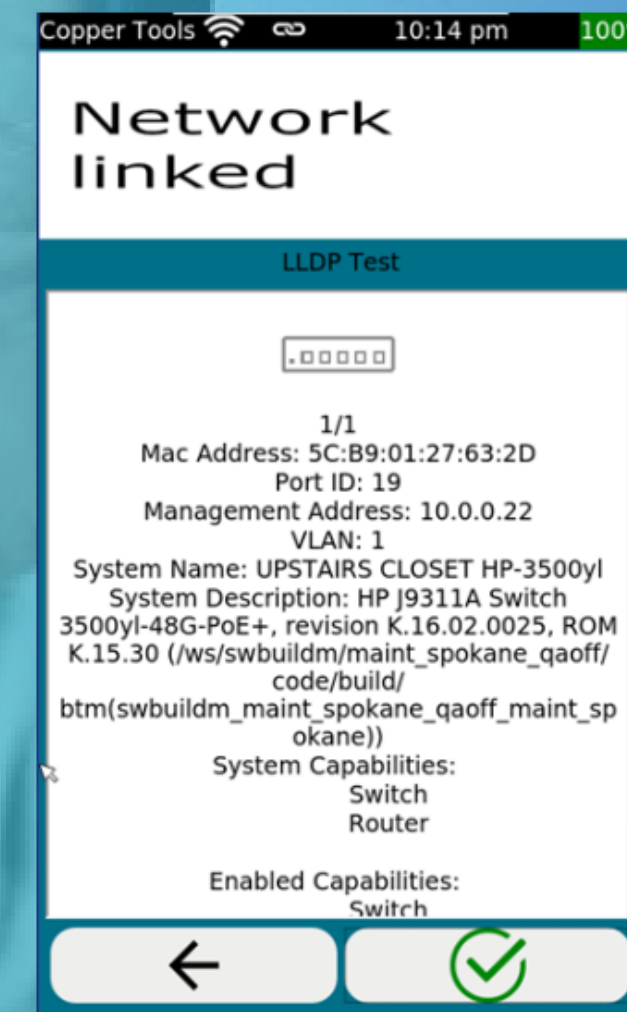
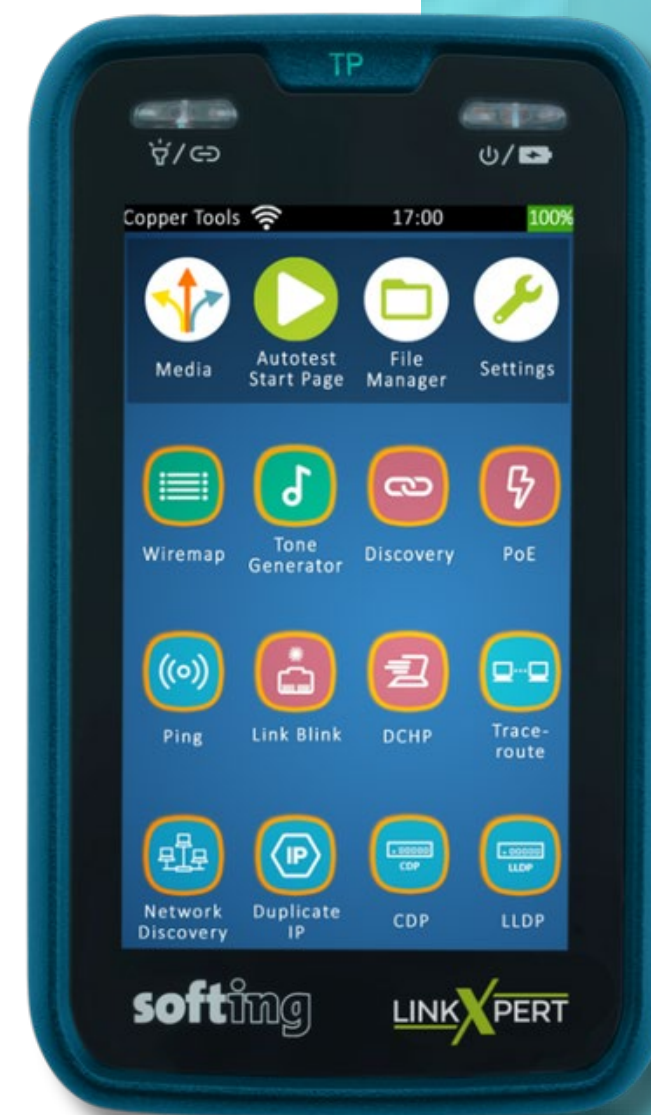
# TESTING FOR DATA CENTER OPERATIONAL NEEDS ALIGNING FIBER COPPER AND NETWORK TESTS WITH FACILITY REQUIREMENTS

- IP cameras and Surveillance
- Poe DC resistance unbalance
- Cat 8/6Acertifies stable power and 4k /8k video streaming
- Fiber OLTS for backbone needs to NVRs
- Corporate management network
- Switch port info isolated management VLANs
- Ping tests for low latency admin access
- Security needs
- Full testing traceroute prevents cabling vulnerabilities EMI and down, access control, intrusion slay and encrypted traffic



# NETWORKING SIDE: SWITCH PORTS, PING AND OPERATIONAL VERIFICATION

- Retrieve the switch port information , VLAN identification,
- Perform Ping Tests – show latency issues and verify that devices are routed into necessary network architecture
- Verify camera connectivity and necessary POE variants at the device
- Test corporate management networks access
- Ensure security systems responsiveness





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# BEST PRACTICES AND CONCLUSION

- Follow manufacturer procedures clean connectors and document every test result
- Schedule periodic retesting as operational needs evolve (new Cameras, security upgrades, management expansion)
- Use certified tools (VFL, OLTS, copper certifier, etc.) for repeatable, standards compliant results that document the job
- Operational success depends on reliable cabling: cameras stay online, management networks stay isolated, security systems stay vigilant
- Comprehensive testing (fiber VFL > OLTS > OTDR) (copper CAT8 ready certifier with DCRU) network troubleshooter> delivers zero downtime readiness
- Conclusion: a properly tested data center is secure , efficient, and fully aligned with the facility's mission critical operations



THANK YOU VERY MUCH  
**FOR YOUR ATTENTION!**

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