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Proven expertise in power and communication

Eleven Rules Towards Better Networks And Faster Internet

Networking infrastructure can be complex, but the results are not. The equation is simple: if your Internet is not up to speed, then your business will suffer the consequences.

A good Internet connection starts with the quality of the cabling work, and getting this right is both an art and science that requires a precise eye and an understanding for the field. There are 11 Rules of Thumb – ROTs – that you can use as a standard guidance for identifying and following best cabling practices.

The following principles aren't just general advice: They're a proven methodology that have been developed over many years of experience and expertise, designed to pre-emptively address the business challenges that could disrupt your digital ecosystem.

If you are in any way unsure about whether your cabling infrastructure meets these ROTs, contact the team at Elam, as following these guidelines can support far better outcomes for your businesses.

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ROT #1: The class of cabling matters

If your network is running slow, then follow this rule: You're only as fast as your slowest team member. Be aware that the slowest cable speed and device interfaces in your environment will be the main determinant in the speed of a network, and you could have the fastest devices and switches elsewhere and it won't matter. With the Cat5 Cabling still operating today in established networks you can see degradation of speed for all devices on that line, and that makes it easier to determine what's causing the slower speeds.

ROT #2:Structure matters

This is a simple one: The optimal cascading of switches should be limited to three levels.

ROT #3: Collisions are a common problem

As you know from ROT #1, the performance of cables, ports and switches may limit the speed of all devices. One of the common causes of this, even in otherwise fast devices, is when a collision occurs.

To be technical: Typically, hardware retries are automated at 16 times, as are software retries. Once this number is exceeded, the frame is lost. Because switches today are full duplex, collisions should be minimised to below 1%, so if you're experiencing anything greater than that, you can assume that you have a problem.

Beyond that, the cumulative effect over the entire switch is compounded by the throughput of the devices on the ports, file sizes and their workloads. These days collisions are supressed unless they exceed the error threshold levels. Again, if you're experiencing this problem, it's time to get the experts to take a look.

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ROT #4: Cables can experience stress

Cables, be they copper or fibre, are subject to stress that can occur on the termination. This can be caused by the patch leads and the diameter of bends in the cable run.

For optimal results, the copper “Bend Radius” should never be less than 10 times the diameter of the cable. This isn’t just about speeds and the quality of your Internet connection. It also helps to ensure longer life for the cabling itself.

As a final note: in all cases where copper or fibre “Loops” allow slack, that should be at least double the Bend Radius. Getting these measurements correct can be challenging in workplace environments, depending on the layout and design. It’s important to talk to experts to make sure that this ROT isn’t broken in an effort to “squish” the cabling into a physical space.

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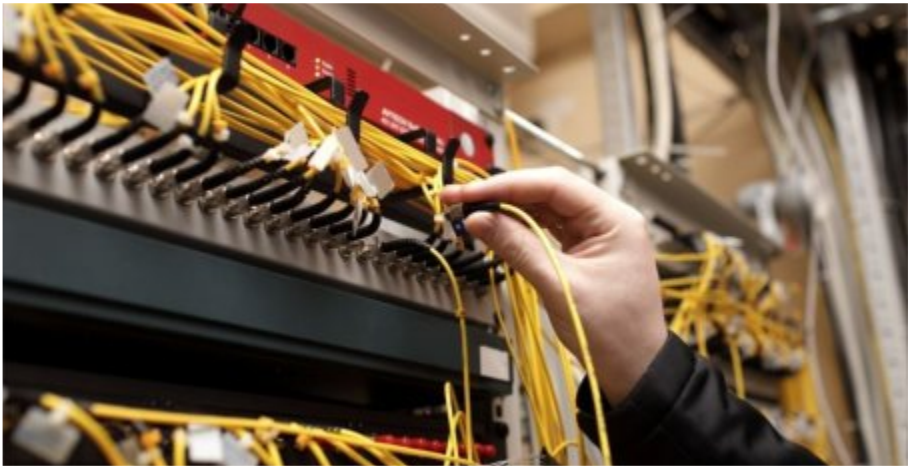
ROT#5: Power cable have limits, too

Power cables need to be restricted in the amount they're bent and stressed, too. In this case, they should be restricted to a bend radius to 10 times the diameter of the cable during installation and 4-8 times the diameter depending upon the size of the cable. Larger is more.

ROT #6: Don't cook your copper

Copper cables of all types can also be impacted by the temperature wherein they are installed. To avoid the deterioration of your connectivity as the cabling heats up, make sure you work with experts who know how to manage cooling of the space so the temperature of the cables does not exceed their specifications.



ROT #7: Show care when installing cables

Fibre cables can be potentially damaged during installation. Unfortunately this is not always noticeable, and won't be detected unless it becomes non-functioning.

Performance attenuation is an issue that can be detected using specialised test equipment. Optical Time Domain Reflectometry (OTDR) testing, for example, can determine the issue within centimetres and should be used after cables are installed to ensure 100% performance is achieved.

So, what kind of performance can be expected?

There are four more ROTs that you can refer to that highlight the kind of performance that you can expect from your network environment, based on the equipment that you have installed. If your actual performance is less than expected, then it's time to investigate to see if you can determine the problem.

ROT #8

USB (Universal Serial Bus) specifications

Emerging from a simple hardware interface for printers and interfacing simple devices, USB has become a serious interface for IoT devices when delivering speed and power support for POE type applications.

USB v1.1	12 Mbps	150mA @ 5V, 0.75Watts
USB v2.0	480 Mbps	500mA @ 5V, 2.5 Watts
USB v3.0	5 Gbps	1.5A @ 5V, 7.5Watts
USB v3.1	10Gbps	20A @ 5/12/20V, 100Watts

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ROT #9

UTP (Unshielded Twisted Pair)

UTP is a historic communications interface that has become standard in most computing environments. It even rivals Fibre in many applications.

Cat 5	<100 Mbps	100m	Fast Ethernet
Cat5e	<1Gbps	100m	Gigabit Ethernet
Cat6	<10Gbps	100m	10 Gigabit Ethernet (55m)
cat6a	<10Gbps	100m	10 Gigabit Ethernet (55m)
Cat7	<10Gbps	100m	10 Gigabit Ethernet (100m)
Cat8	<250-400Gbps	30m	RJ45 Shielded only

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ROT #10 : Fibre Optic Cable speeds

Long considered the only service for long distance and reliable high-speed transmission, Fibre optic has longevity and multiple channels to recommend its application.

Speed/Len	1Gbps	10Gbps	40Gbps	100m
OM1	275m	33m	N/A	N/A
OM2	550m	82m	N/A	N/A
OM3	550m	300m	100m	100m
OM4	550m	400m	150m	150m
OM5	550m	400m	150m	150m
Singlemode		up to 2Km withPSM4		

NB These parameters are generalised but represent a guideline when considering network performance

ROT #11 : Power Over Ethernet (POE) capability . Where we should use it

Name	IEEE Standard	Power to Powered Device (PD)	Max. Power per Port	Energized Pairs	Supported Devices
PoE	IEEE 802.3af	12.95 W	15.4 W	2-pair	Static surveillance cameras, VoIP phones, wireless access points
PoE+	IEEE 802.3at	25.5 W	30 W	2-pair	PTZ cameras, video IP phones, alarm systems
PoE++	IEEE 802.3bt (Type 3)	51 W	60 W	4-pair	Video conferencing equipment, multi-radio wireless access points
PoE++	IEEE 802.3bt (Type 4)	71.3 W	100 W	4-pair	Laptops, flat screens

Need help fully optimising your networking environment?

If you're observing speeds that are lower that you would have expected, based on the above charts and data, it's worth getting in touch with the cabling and networking experts at Elam.
With our support, you'll discover speeds that you had no idea were possible, and your business will ultimately benefit from the additional digital capabilities.

Contact us today on 02 9809 2999