

Applying Category 7 Cabling in the Real World

Case Study: Robert Bosch Ltd



Much has been talked about in the industry in the past few months about the rise in uptake for [Category 7](#). As an example of its application in the real world this case study looks at the first phase (1,000 outlets) of a 1,800 point rollout at Robert Bosch Ltd where the latest cabling technology fit into a Category 5e budget, not to mention some tight spaces.

Power tools for professionals and DIY; automotive spares such as alternators, motors, controls and diesel injectors; SatNav, multimedia in-car entertainment systems and even security systems and cameras are all the everyday fare of orders and shipments at the Robert Bosch Ltd UK headquarters and distribution center at Denham in Buckinghamshire.

A large part of keeping 600 people and their UK business going has until recently been the task of an 18 year old IBM Type 1 cabling network. Until now that is, because phase 1 of an ultra-futureproof Siemon TERA Category 7 solution has now catapulted the Robert Bosch Ltd offices back to the forefront of LAN technology.

The company, founded by Robert Bosch in 1886 has been around in the UK for a very long time - 109 years to be precise. Starting out with the development of the low-voltage magneto to produce sparks for stationary gas-engine ignition, the company has now grown to a massive €41.5 billion international turnover with products in all areas of automotive from spark plugs to diagnostic test equipment, DIY power tools, garden tools and household white goods, heating and hot water solutions, power tools for professionals, security systems and even packaging technology. Oh yes, and they even offer call-center services and manufacture micro-miniature MEMs (Micro Electro Mechanical System) chips that include tiny mechanical elements in their electronic logic.

Best of breed



According to Robert Bosch Ltd IT infrastructure manager Trevor Lavender, the IBM Type 1 cabling system in the UK headquarters and distribution center would have been state-of-the-art when it was installed into the building in 1989. "Bosch always [standardizes](#) on the current most futureproof cabling system," he says, "and although in recent years the old system has constrained us a little, the fact that it is still operational 18 years after its installation gives total credence to the **Bosch futureproofing strategy**. If you look at this from an annualised cost of ownership perspective, the return on investment is far greater as the system has such a long lifespan."

In fact, although the first floor of the main offices has now been re-cabled to the new Category 7 standard, the ground floor of the main offices is still operating over the old wiring pending the second phase of renovation.

The old system was designed for 16 Megabit/s token ring and dumb terminal devices at a time when [Ethernet](#) was only 10 Mbit/s and a PC on each desk was a rarity. Today, token ring and dumb terminals being largely a thing of the past, it is constrained to 10Mbit/s Ethernet and expensive baluns are needed at every switch port and PC to convert from the cable's 150ohm impedance to the 100ohm required by Ethernet NICs (network interface cards). But these things have only been an inconvenience according to Lavender, the main problem in today's IT-dependant business is simply that the building wasn't wired with the level of outlet density that we expect and need nowadays. Quite simply, the building was running out of capacity.

"Almost everyone now needs at least one phone connection and one data connection," says Lavender, but there was nothing like that level of need or provision 18 years ago. Of course there had been additions to both data cabling and power but this was more 'organic' than planned and so when it came to moves, adds and changes (MACs) the lack of spare capacity and the fact that the phones are all connected through a separate old-fashioned PABX cabling system has meant that moving people around was often a little nightmarish!"

Hopefully all of that will now be a thing of the past with 1,000 new outlets and 150km of cable on the first phase alone.

Choosing Category 7

Category 7 has been chosen by Bosch as the preferred worldwide solution. Minimising the number of different solutions used throughout a global business pays significant

dividends in terms of staff training and familiarity costs and means that staff from anywhere in the world are familiar with the systems their colleagues are running whenever help is needed.

"We were concerned, when we first found out that the company specification was for Category 7 that it would be expensive," said Lavender, "but there was quite a saving in both time and expense because, having a company standard, there was no need to go through a complex evaluation procedure. Another significant benefit is the anticipated life we will get from this cabling system. Looking at TERA over a lifespan of up to 15 years, we expect to see a lower [total cost of ownership](#) than we would have in the same period if we were to re-cable. "

Also, Category 7, which the company adopted as its standard some time ago was then (and in fact remains so until later this year) the only currently ratified category/class of copper cabling specified for support of [10GBASE-T](#).

Less cables = more outlets.



"One of the main reasons that we chose the Siemon TERA Category 7 solution over other systems," said Lavender, "was its unique [cable-sharing](#) capability. Not only are all four pairs in each Category 7 cable individually shielded (a standard feature of Category 7) but the Siemon TERA connector actually provides a multitude of connectivity options from its standard 4-way interface, for various applications. For example a single [TERA outlet](#) can support 4 analog phones, 2 10/100Mbit/s connections or utilize all four-pairs for Gigabit and 10Gigabit data."

"The Bosch standard suggests three outlets per desk or workstation as a flood-wiring requirement to assist future needs. If we had used Category 5e, 6 or 6A, this would have meant three cables per desk back to the comms room. However, because of this cable sharing technique, we've only needed to provide two TERA cables and outlets which will allow four 10/100 devices or mixtures of data and phones. In fact, on day one, most desks have been equipped with a 100Mbit/s data connection and a telephone leaving the second TERA cable completely un-used for future Gigabit/10Gigabit requirements."

"A real cost benefit of this cable-sharing technique is that we've actually got more outlets and more futureproofing for the same cost as a Category 5e solution would have been," Lavender claims.

Tight-fit

According to Wayne Harding, project manager of [Siemon Certified Installer](#) Pandi, "one of the major challenges of this new installation - which coincided with an electrical re-wire as well - was the floor void or, in fact, the almost total lack of one. Because of the way the offices had been built many years ago inside what was formerly only a warehouse building, the underfloor gap was only two inches - and all of the structured cabling as well as the new electrics had to go in there in a nice tidy and organised fashion."

"Naturally, Category 7 cables are thicker than Category 5e, but in fact they are often thinner than the new Category 6A unshielded cables and the fact that cable-sharing meant we only needed two cables per workstation instead of three made the underfloor situation considerably better."

"Everyone thought that the small underfloor void was going to be a problem for the bend-radius requirements for the cables," explained Lavender, "but in fact we devised a very simple angled outlet panel for the floor boxes, inspired by some something we saw in the Siemon demo room, that meant that the cables are hardly bent at all, either below floor or as they exit the floor boxes."

Pandi and the electrical contractors devised a modular underfloor system which uses an underfloor bus system for the power and the consolidation box principally for the structured cabling. In practice this means that each floorbox actually has flying leads for structured cabling and power so there is no constraint or compromise on where the floor can be fitted. When it comes to MACs the floorbox is simply mounted in the ideal position and the flying leads run to the nearest underfloor TERA and power outlets which are on a 6 meter grid layout.

Critical applications



The Siemon TERA system is already operating the business-critical sales order processing system used to process hundreds of new orders, despatches and progress enquiries every single day. Other critical applications include the door access security controllers and locks and the IP security cameras - with all of these security devices being Power-over-Ethernet (PoE) powered to avoid having to run mains electricity to each point. The same is true for WiFi access points in the ceilings, again avoiding the unnecessary expense of running power outlets in specially.

Digital phones, analogue phones, DECT phones, fax machines and 10/100Mbit/s data are of course the bread-and-butter applications running throughout the new network.

Safety and security in the Telecom room

Siemon [TERA Category 7](#) is of course fully backward compatible with [Category 6A](#), [6](#) and [5e](#) solutions and simply uses [hybrid patch cords with TERA plugs on one end and RJ-45 plug](#) on the equipment end for switches, PCs printers and the like. TERA outlets fit within a standard RJ-45 footprint.

In the comms room, Lavender and his colleagues chose to use the cross-connect for patching where all connections from the switches are brought out onto patch panels so that the switch end does not have to be touched by technicians during MACs. "We've used the innovative Siemon BladePatch RJ-45 connector," Lavender points out, "because in the very high outlet density area of the switches they are far easier to insert and extract than conventional RJ-45s with that difficult catch mechanism. However, the switches stay in safely locked rooms to avoid the possibility of accidental finger trouble and expensive network downtime."

The final verdict

Now that Lavender and his colleagues at Bosch have been using TERA Category 7 for a while, what is their verdict? "It took a bit of getting used to, simply because we are all so used to an RJ-45 world, " he concluded, "but it's such a strong and sturdy connector that it gives you real confidence that it's built to last and from an engineering perspective it really is in a different league. I don't know if my successors will still be using this system in another eighteen years, but of all the systems there are to choose from I reckon this one's got the longest life-potential of any of them right now."

Additional Information

- [Category 7/7A and Siemon's TERA system.](#)
- [Cabling Life Cycles and the Laws of Networking Communications](#)

About Pandi

[Pandi](#) is an IT Network Services company. It creates, maintains, enhances and manages world class IT environments for clients ranging from blue chip enterprise organisations to mid cap corporates to SME's. The company's portfolio comprises managed services, infrastructure solutions and end point applications from a number of market leading manufacturers.

Founded in 1988 by current Chief Executive Ian Summerfield, Pandi is headquartered in Chalfont St Peter with regional offices in Cheltenham, Cardiff, Glasgow and London. The company currently employs 250+ staff and has an annual turnover of circa £24 million with ambitions of a turnover of £50 million by 2009.

About Bosch

The Bosch Group is a leading global supplier of technology and services. In the areas of automotive and industrial technology, consumer goods, and building technology, some 260,000 associates generated sales of 43.7 billion euros in fiscal 2006. The Bosch Group comprises Robert Bosch GmbH and its roughly 300 subsidiary and regional companies in

more than 50 countries. This worldwide development, manufacturing, and sales network is the foundation for further growth. Bosch spends more than three billion euros each year on research and development, and in 2006 applied for more than 3,000 patents worldwide. The company was established in Stuttgart in 1886 by Robert Bosch (1861-1942) as the 'Workshop for Precision Mechanics and Electrical Engineering'.

The special ownership structure of Robert Bosch GmbH guarantees the entrepreneurial freedom of the Bosch Group, making it possible for the company to plan over the long term and to undertake significant up-front investments in the safeguarding of its future. Ninety-two per cent of the share capital of Robert Bosch GmbH is held by Robert Bosch Stiftung GmbH, a charitable foundation. The majority of voting rights are held by Robert Bosch Industrietreuhand KG, an industrial trust. The entrepreneurial ownership functions are carried out by the trust. The remaining shares and voting rights are held by the Bosch family and by Robert Bosch GmbH.

Additional information about Bosch can be accessed at www.bosch.com and www.bosch.co.uk

About Siemon

Established in 1903, Siemon™ is an industry leader specialising in the manufacture and innovation of high quality, high-performance network cabling solutions. With global offices and partners throughout the world, Siemon offers the most comprehensive suite of copper (unshielded and shielded twisted-pair) and fiber cabling systems available and is one of only three network cabling infrastructure companies worldwide with true global partnership capabilities. With over 400 active patents specific to structured cabling, Siemon Labs invests heavily in R&D and development of industry standards, underlining the company's long-term commitment to its customers and the industry. »[Siemon Network Cabling Systems](#)



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