



Benchmark AV Brings Innovative Teaching and Learning to the University of Technology Sydney



One of the largest universities in Australia with an enrolment of more than 44,000 students, the University of Technology Sydney (UTS) is a public university of technology located in the heart of Sydney's creative and digital precinct and central business district. With a culturally diverse campus life and strong commitment to research and innovation, UTS offers more than 130 undergraduate and 210 postgraduate courses across a variety of disciplines, including architecture, built environments, nursing, pharmacy and science.

A Partnership Made for AV over IP

Solutions: Z-MAX®

Services: PoE and HDBaseT™ AV over IP

Vertical: Education

Location: Sydney, Australia

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- Aaron Costell, Manager of audiovisual services (AVS) projects, UTS

Connecting UTS to a Higher Standard

The 10-year UTS campus master plan has included the construction of several impressive buildings, from the 17-storey UTS Central glass tower known as Building 2 and adjacent Vicki Sara science building, to the Faculty of Engineering and IT (FEIT) sustainable building and the iconic 13-storey Dr Chau Chak Wing business school fondly referred to as the “crumpled paper bag” due to its unique design by architect Frank Gehry. While the striking architecture around campus has received much attention and accolades, it's the benchmark audio-visual (AV) deployments that have truly brought to life UTS' innovative teaching, learning and social spaces.

Over the past decade, AV systems have started shifting from connecting via expensive matrix switches and dedicated coaxial and component cables with varied device connections to lowvoltage Internet protocol (IP)-based structured cabling that offers increased functionality, performance and cost-effectiveness. While this trend is still growing among higher education institutions, UTS has embraced structured cabling for AV since 2010—driven by a strong forward-thinking AV team in conjunction with high-quality infrastructure solutions from a likeminded industry leading partner.

The ability to colour code cables via structured cabling facilitates management, maintenance and troubleshooting

A Better Way to Connect

In an AV over IP system, devices such as displays, control panels, projectors, cameras and speakers connect using the same cabling media that has long been deployed for Ethernet networks supporting voice, data, Wi-Fi, security and other IP-based systems. Connecting AV systems over network cabling eliminate the need for costly, often difficult-to-install proprietary AV cabling systems, saving on material, labour and maintenance. It also better facilitates centralised control, enhances flexibility and scalability, and provides the potential for integration with other IP-based applications.

Because structured cabling has advanced to support high-speed gigabit Ethernet and beyond, it also enables the transmission of ultra-high definition 4K video signals that deliver a better viewing experience with sharper, crisper images and greater colour depth, as well as the transmission of audio and AV control signals. To adequately deliver these advanced AV signals, 10-gigabit capable Category 6A balanced twisted-pair cabling and connectivity is recommended as the minimum for AV over IP deployments up to 100 metres in length, with optical fibre used for environments that require longer cable runs, such as stadiums and other larger venues.

“Several years ago, there was a need for UTS to standardise on a single cable technology for efficiency and flexibility. Adopting the same structured cabling approach used for the IT network has provided a modular solution that gives us the ability to design, build and test AV systems off site and then simply patch into the installed infrastructure. Not only is this a huge time saver that prevents the disruption involved in building and configuring AV systems on site, but it also allows us to develop standard building blocks for the

design and implantation of future AV projects,” says Aaron Costello, manager of audio-visual services (AVS) projects for UTS. “Our approach is in line with what the AV industry is now doing on a wider scale, and we’ve been able to easily shift from Crestron’s DM [digital media] system to the Crestron NVX AV over IP solution because we have structured cabling in place to support it.”

AV over IP minimises traditional point-to-point cabling and allows for connecting any AV device to any outlet, providing UTS with flexibility, consistency and cost savings. For the cabling and connectivity that comprises the Crestron AV systems within campus buildings, UTS standardised on a Siemon’s Z-MAX® Category 6A shielded system that features high performance margins across all transmission parameters. The system includes category 6A F/UTP cable, outlets, modular cords, patch panels and work area solutions. In fact, UTS uses the Z-MAX Category 6A shielded system for all its IP-based applications throughout campus, including voice, data, Wi-Fi, security and more.

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A key advantage to the Z-MAX 6A shielded system is the ability to better support remote power technology like Power over Ethernet (PoE) and Power Over HDBaseT™ (POH) that delivers DC power to devices simultaneously with AV signals. Advancements in technology now allow up to 90W of PoE power and 100 watts of PoH power to power a broader range of AV devices, which continues to drive the use of remote powering in these applications.

“For years, one of our biggest AV challenges was dealing with failed power supplies. We are starting to do a lot more with PoE for AV systems, which will allow us to limit the use of power supplies,” says Costello. “Our AV control panels, meeting room booking panels and cameras are now powered using PoE and there is potential for us to power additional AV devices in the future.”

With today’s higher levels of remote powering comes the potential for heat build-up within cable bundles and electrical arcing damage to connector contacts, which can lead to power and efficiency losses, performance degradation and the potential for damaged connecting hardware. The Siemon Z-MAX Category 6A shielded system features PowerGUARD® technology with cables and connectors specifically designed for reliable remote powering. Z-MAX shielded cables are qualified for high temperature environments up to 75° C to provide superior heat dissipation and extremely stable transmission performance. The Z-MAX connectors feature a patented crowned jack contact shape that prevents arcing damage that can be caused by unmating a jack-plug connection while transmitting PoE or PoH.

Another advantage to using standards-based structured cabling for all low-voltage systems is the ability to colour code cables and connectivity, especially where multiple systems converge within UTS telecommunications rooms. With Siemon’s ability to deliver multiple colour options, UTS was able to easily standardise on the colour Yellow for all AV connections, Green for security and Blue for data. This allows them to easily identify which links are intended for which application, supporting simplified management, maintenance and troubleshooting

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Leading Edge AV Capabilities

While AV has been instrumental in education since the early use of overhead projectors, instructional and learning concepts have evolved alongside AV to the point where higher education is experiencing significant benefits.

Through the integration of AV technology, colleges and universities are enhancing professor-student collaboration, increasing student engagement and providing immersive, real-world learning experiences through technologies like virtual and augmented reality. This is exactly what is happening in high-tech spaces throughout the UTS campus, from innovative super labs and data arenas to a range of unique and collaborative learning spaces.

Inside the 17-storey UTS Central Building 2 is a new 250-seat Superlab that leverages AV technology to allow up to seven classes to operate simultaneously. Referred to as ‘The Hive’ based on its hexagonal learning pods, the lab features strategically located 65-inch monitors set into angled overhead bulkheads that provide a clear view to every space. Visual signals are also relayed wirelessly to student tablets, allowing them to move freely throughout the space. Demonstrator stations use a Crestron DigitalMedia presentation switcher with camera to provide close-up views of experiments that can be pushed out to the student tablets, and sound is distributed to wireless student headsets using Digital Audio Network Through Ethernet (Dante) that transmits digital audio signals over the IP-

based network.

Several UTS buildings also feature collaborative classrooms that ensure students effectively see and hear the learning materials being presented, enable small-group collaboration and allow each group to present their own work on the displays. This is achieved through an advanced Crestron AV system with dual-source projection and lecterns that allow for teaching to the entire space or to specific smaller collaboration stations. Located within the Vicki Sara science building (Building 7), UTS also has a Science Super Lab that was the first of its kind in Australia when it opened in 2014. It features demonstrator stations equipped with a PC, document camera, microscopes and AV controllers along with 26 workbenches seating 8 students that each have an AV touchscreen and microphone. The system allows for two-way communication between the demonstrator and the class and content display from any student.

The Data Arena located in the Faculty of Engineering and IT (FEIT) building features a large curved screen four metres high that enables 360-degree 2D and 3D interactive data visualisation via multiple in-sync projectors. Using open-source software to transform numbers into interactive geometry, the Data Arena combines visual effects and data visualisation allowing students to interact with visual interpretations of data to gain unique insights into patterns and anomalies that can unlock advances in a variety of fields.

Fully configurable presentation areas and media labs, AV-equipped group study spaces, realtime information displays, and several other AV systems also contribute to ensuring UTS' innovative teaching, learning and social spaces, as well as enhanced sports and leisure activities for an overall enhanced campus life. According to Costello, the AV systems are a key factor in creating these spaces.

"We need the ability to use these digital spaces for multiple uses and classroom sizes, while supporting a wide range of AV needs throughout campus," he says. "Traditional fixed AV systems would be very limiting, but with a structured cabling approach, we have a lot more flexibility— instructors can wheel in systems, connect to any point in the space and use the AV controllers to determine what the content is and where it should be displayed."

UTS' AV systems have also been instrumental in supporting remote learning during the COVID-19 pandemic, enabling a mixed learning environment with some students on site and others remotely connected. This is especially critical for UTS' large numbers of international students to continue their education amidst travel restrictions.

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Shorter Z-MAX 45 outlets enable 45-degree cable terminations for tight-fitting spaces.

The Power of Partnerships

Effectively deploying AV over IP systems requires collaboration across AV and IT teams due to shared pathways, spaces, components and installation requirements, and UTS' AV Services and IT Division pride themselves on working together. Project managers for all campus AV projects engage with both departments to ensure that all deployments are done in compliance with university specifications and industry standards.

"AV over IP requires both AV and IT teams to meet regularly, and we have established systems in place with regards to how we share documentation," says Jonathan Mansfield, IT division project manager for UTS. "We have consolidated information regarding devices, serial numbers and MAC addresses that lets us see all the information in one place for easier troubleshooting and commissioning of network switches."

Having strong external relationships with technology vendors like Crestron and Siemon have also been instrumental to achieving effective AV deployments at UTS. For example, having a good relationship with Siemon provides UTS with a trusted advisor to ensure superior logistics for on-time delivery, strategic pricing to meet budget requirements and first-hand information about new innovative solutions that can help both AV and IT teams effectively manage and deploy technology.

One unique Siemon product that has been ideal for UTS AV deployments is the low-profile multi-user telecommunications outlet assembly (MUTOA) designed to provide up to 18 Category 6A connections. This low-profile surface mount box offers rear or top cable access, space for cable slack while maintaining minimum bend radius and can be mounted to standard electrical boxes. "The MUTOA has been ideal as a consolidation point at lecterns to connect several devices, including instructor laptops, AV control panels, monitors and document cameras," says Costello.

One of the components of the Z-MAX system that has been beneficial to UTS is Siemon's patented Z-MAX 45 shielded Category 6A

outlet that provides a shorter, compact design with the ability to terminate cable at a 45-degree angle from two different directions. According to Mansfield, this was especially ideal for tightfitting spaces such as those used for connecting AV control panels or for connections located in shallow skirting duct (i.e., raceway). Connections in tight fitting spaces were also eased with Siemon's SkinnyPatch™ modular Category 6A shielded patch cords that feature a reduced cable diameter using 28 AWG stranded copper construction.

"We have meeting scheduling panels outside of conference rooms and study spaces, and the glass walls surrounding these spaces limits the amount of space to connect the devices," says Costello. "The SkinnyPatch is an ideal solution for this application since it takes up less space and offers a tighter bend radius."

UTS has had a relationship with Siemon for about 25 years, and that has continued through multiple tendering processes that are conducted every five-to-six years. "Not only are Siemon's products excellent quality and they continue to innovate, but we can call on them any time," says Mansfield. "The Siemon Team frequently comes on site to show us new products and to check our installation for compliance, and they have provided UTS staff with training on what to do and what not to do when installing structured cabling."