Deploying External Wi-Fi on a Campus Based Network

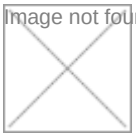
Written by Pranay Pancholi, February 2013

Introduction

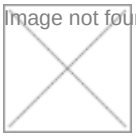
Loughborough University is the largest single site campus University in the United Kingdom, spanning 437 acres of land. As part of delivering the strategy for the University, a comprehensive, reliable and leading edge wireless network is required, if not demanded.

Loughborough University currently has 1300 lightweight Access Points (AP), deployed with ubiquitous coverage inside buildings for students, staff and visitors. With the ever rising demand for using mobile devices such as smart phones and tablets, it presents a challenge to provide coverage in as many locations as possible. The extensive demand for Wi-Fi coverage has now risen to support end-user clients in external outdoor locations throughout campus, to enable even more mobility.

This case study focuses on the design and installation stages undertaken to achieve a successful deployment of external wireless service at Loughborough University. We acquired from our vendors various types of access points and antennas that were trialed, and from our tests, a suitable device was selected which supports our current backbone infrastructure.



The chosen AP used is Cisco Aironet 3500 series (AIR-CAP3502P-E-K9) and its supporting antenna, the Cisco Aironet Six Element Dual-Band MIMI Patch Array Antenna (AIR-ANT25137NP-R).



Description of Work

The demand for supporting clients externally has increased due to the rising number of portable devices as well as an increase in the number of areas where people congress on campus. A set budget had been allotted to purchase ten APs and supporting antennas. From the allocation of hardware, various suitable locations on campus had been selected.

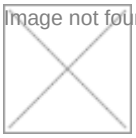
Some of the key factors that had been considered upon deployment were:

- Suitable physical locations to mount external antennas.
- Physical mounting locations of internal Access points.
- Availability of internal data cabling (CAT6).

As 10 Antennas and APs had been purchased within our budget for this project, it was required to identify 10 suitable key locations on campus for installation of these devices. The locations had been determined where people would congress on a frequent basis. There were a total of 16 chosen external locations identified that we wanted to have wireless coverage. This had been reduced down to 10 locations based on priority and usage.

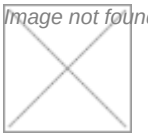
Areas such as communal areas where people would congress were taken into consideration first: outdoor seating areas and outdoor sport venues (football/rugby/tennis pitches). Once the various locations across campus had been selected the next stage was to determine a suitable location to mount the external antennas. Antennas are required to be wall mounted to a nearby building that would propagate the signal to a designated area. This would allow for the antenna's coaxial patch cords to be patched directly to the internal AP that would be installed on the inside wall of the building. As the internal AP requires an active data network connection, a data socket is required to be present nearby to the AP. In some cases cabling was already present, therefore the AP can be easily patched in using short patch cables. However in some cases where structured cabling was not present close to the internal AP, the installation of additional structured data cabling was required.

The pictures below illustrate a survey for location of mounting antenna and internal AP/ cabling:



An identified location on campus where people would congress on the outdoor seating area.

The antenna would be mounted on the outside facing wall pointing to the seating are. This is the only suitable area as the internal AP can be easily mounted where data cabling can exist.

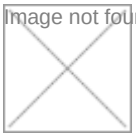


The mounting and securing of the antenna is simply achieved by drilling 4 holes from the mounting plate onto the wall. An additional hole is required to feed the coaxial patch leads from the antenna to the inside wall to allow for the patch leads to be attached to the internal AP.

As the antenna has a pair of coaxial leads, one for 2.4Ghz and the other for 5Ghz, a hole is required on either side of the antenna to feed the coaxial leads through.

In some cases where nearby cabling existed, we were simply able to pull cabling back and re-terminate close to the internal AP. The antenna has 6 coaxial lengths that require to be connected to the AP.

Within this building it was simple enough to drill holes in the wall in which the coax from the antenna could easily be fed through to connect onto the AP. A nearby data socket had been installed to patch the AP onto the network.

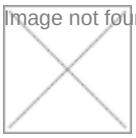


1.*The coax is fed from the hole in the wall that is then attached onto the AP.*

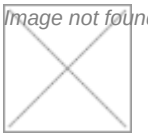
2.*CAT6 structured cabling had been wired close to an internal Access Point.*

(Cisco CAP3502P)

Sometimes the lengths of the coaxial patch leads from the antenna are too short to be able to be connected onto the internal AP. Therefore additional individual strands of coaxial cables are required to extend the reach. We had purchased individual strands of HDF400 leads with reverse TNC plug and socket connectors pre-attached, which can be connected onto the existing coaxial from the antenna which then can be connected onto the internal AP.



An instance where additional HDF400 3 meter extensions leads are attached to the existing coaxial leads from the antenna.



Next, we are then able to connect the opposite end of the HDF400 cable to the internal AP. This is at a more convenient location so that in the event of any hardware failures with the AP it can easily be replaced. This is installed within a loft space.

Conclusion

By following the methods as mentioned above we were successfully able to support clients to obtain wireless coverage in external locations. This part delivers the campus's objective to increase deployment of the wireless service. Over the deployment phases we were able to cover various locations using this method of installation. A wireless service was successfully deployed on campus in locations such as cricket grounds, football pitches, tennis courts and other outdoor seating areas.

To successfully implement installations, a large proportion of planning and investigation is required. Surveys are required for suitable locations to erect antennas and also to identify the

presence of any data cabling available nearby. It is therefore essential to work with colleagues within Facilities Management to ensure if any obstacles occur in terms of installation, then to determine if any resolutions can made. During the installation stage (which is carried out by an external contractor) colleagues within IT are often paired together to ensure the install is successfully completed. Other various external factors are required to determine if antennas can be installed. For example if there are any trees and water present, how effective would be the signal penetration in that given location?

If various buildings on campuses are to be refurbished or demolished and purposely re-built, there is an opportunity for external wireless hardware to be fitted as a first rate fix. Accessible service ducts can be provided for local IT staff to maintain and easily install hardware in the event of any failure. Various colleagues within IT Services, Facilities Management and any third party external contractors must share thoughts across the board and, dependent on budget, discuss if it is feasible to implement at this stage.
