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Wireless LAN

Technical specification

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Introduction

Heathrow has been the busiest international hub airport in the world for the past decade, handling more than 70 million passengers on an annual basis.

In order to successfully cater for such an extraordinary high volume of traffic, the airport operation must be based on firm technical foundations, providing a reliable, un-interruptable service. The IT infrastructure at Heathrow has been built to meet this challenging criteria, and is being constantly upgraded to adopt the latest innovations and standards. It has proven to be well designed and able to handle business as usual operations, as well as to cope with the unexpected events.

Now, all Heathrow airport tenants whether they are airlines, retailers or support service companies can benefit from this powerful IT infrastructure, which has been built for airport operations. Modern, resilient, built for the airport by the airport – the IT services portfolio, using the Heathrow common IT infrastructure, is constantly evolving to bring our customers the products they need to benefit their business.

Heathrow Wireless LAN (WLAN) coverage is provided via resilient access points to guarantee coverage even in the event of the failure of a single access point. The infrastructure is also capable of transparent roaming between access points to provide a seamless customer experience. The solution connects mobile workers at Heathrow to back office systems simply, cost-effectively and securely, wherever they are and in real-time.

Service overview

The WLAN service operates over the Heathrow Managed LAN. It provides secure ubiquitous WLAN coverage through all operational areas of Heathrow. It is based on a hierarchical model, with significant diversity, providing the highest levels of resilience and availability. The modular network design means that it can support changing business requirements quickly and simply.

The strategic approach taken allows Heathrow to provide a single, common WLAN at any requested site. This approach means that Heathrow will be the sole provider of a unified WLAN system that is capable of supporting its own requirements, plus those of airlines, other support services tenants, retail, baggage systems and public wireless ISP services. The benefits of providing a single WLAN infrastructure include:

- The ability to control the radio frequency (RF) coverage and limit interference.
- The ability for multiple vendors and 3rd parties to utilise the WLAN infrastructure.

The Heathrow WLAN network is deployed with an Aruba Networks infrastructure which allows the service to offer and provide the following options:

- Fully resilient and reliable wireless controller hardware.
- Dedicated Enterprise Management Solution for enhanced trending reports and location based applications.
- Highly knowledgeable, flexible staff, having a willingness to adapt their product for Heathrow requirements within the timescales required.

Service overview

High level design

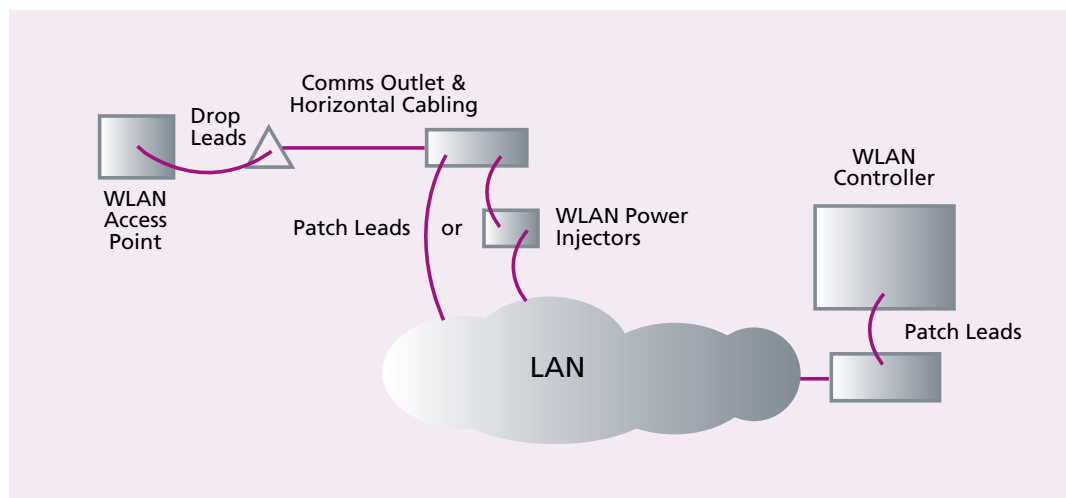
Typically, a WLAN infrastructure consists of the following physical components:

- External or built-in antennas to provide the RF coverage to wireless clients.
- Feeder cables to connect the antenna to the Access Point (AP) or surge protector where external antennas are in use.
- Surge protectors or lightning arrestors to protect externally installed antennas.
- APs to provide the connection between the client and the fixed LAN infrastructure.
- Power over Ethernet (PoE) switches mid-span and end-span PoE devices to provide power to the APs.
- WLAN controllers to provide the central intelligence, security and packet forwarding.

External WLAN antennas are connected to APs using feeder cables which are terminated with the appropriate connectors. Where required, surge protectors can be installed between the antenna and the AP to provide protection to externally installed antennas.

The AP is connected to the fixed LAN via its Ethernet port using a standard Cat5/6 Ethernet cable and provides the interface to the switched infrastructure.

In a centralised WLAN deployment, WLAN controllers provide the central intelligence where various WLAN parameters are managed and communication between APs and WLAN controllers is carried out through the fixed LAN. The following diagram shows a connectivity model for this infrastructure:



Service overview

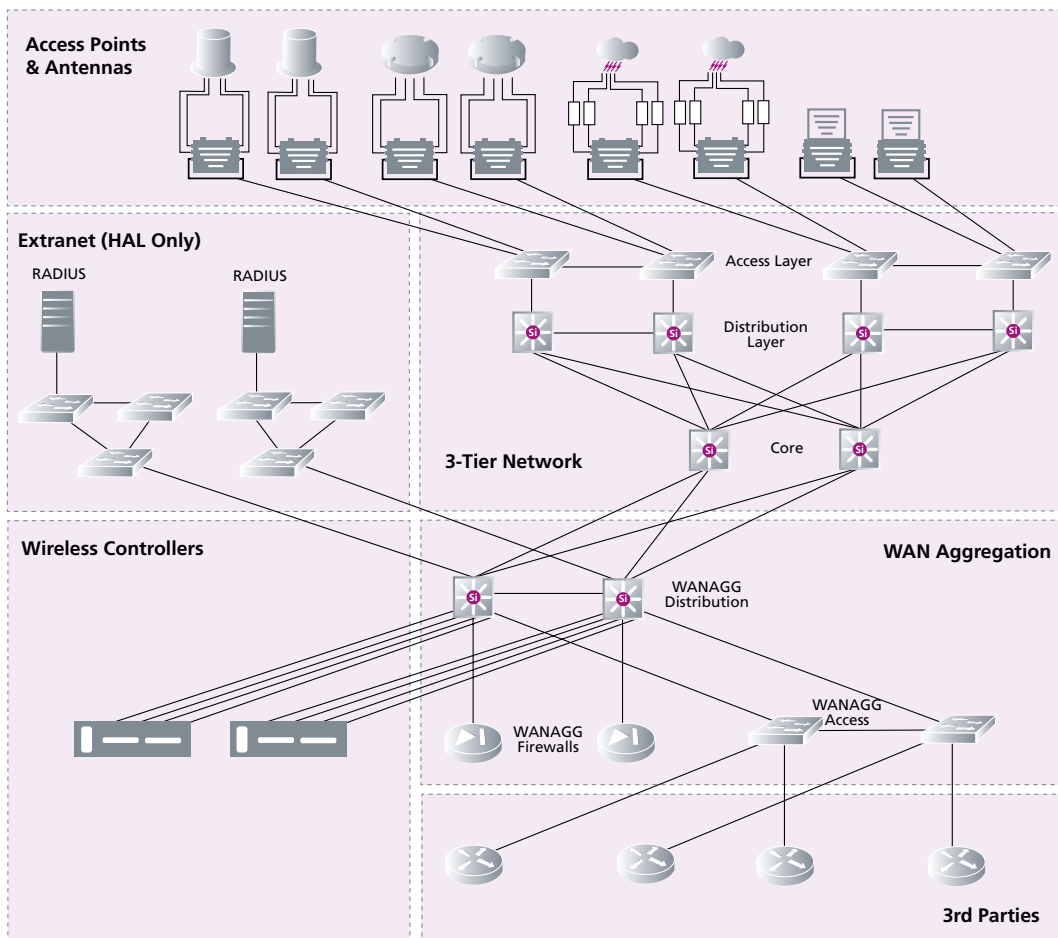
High level design – continued

The WLAN design for Heathrow is an overlay to an existing 3-tier network - the framework of the existing LAN network.

The APs are installed at the edge of the network and connected to access layer switches to provide coverage in the required areas.

The WLAN controllers are installed within the WANAGG (WAN aggregation) and connected to a pair of WANAGG distribution switches to provide transport for ingress and egress traffic.

Communication between the APs and the controllers will be provided by the MPLS (Multi Protocol Label Switching) core and configured with a dedicated VPN to provide traffic separation from the rest of the Heathrow corporate LAN. Egress traffic from the controller will be trunked to the WANAGG distribution switches where virtual LANs (VLANs) will provide traffic separation for the different user groups. These VLANs will be configured to direct the traffic toward their destination.



Service overview

Technical specification

The Heathrow Common Infrastructure WLAN is built upon the following parameters and specifications allowing for a robust and efficient network:

- Single SSID (Service Set Identifier), configuration and end-to-end commissioning based on individual requirements.
- Operates over 2.4GHz and 5GHz RF spectrum (802.11a/b/g/n).
- Supported security standards: Open, WEP, WPA Personal / Enterprise, WPA2 Personal / Enterprise.
- WLAN infrastructure supports bridge mode.
- WLAN (APs and controllers) are monitored on a 24 hour basis.
- Supported Encryption standards: WEP / RC4, KIP / RC4, AES / CCMP.
- Supported Authentication standards: Shared Key, PSK, EAP / LEAP / PEAP, TTLS, RADIUS.

Central WLAN controllers located in the airport data centres, these devices performing:

- System configuration.
- Client traffic processing.
- Client traffic routing.
- Firewall & Security Functions.
- User & System Authentication.
- Packet Encryption & Decryption.
- Radio resource control.
- AP configuration management.
- Rogue AP Detection.

APs performing:

- Wireless packet reception & transmission.
- WLAN packet encapsulation.
- User traffic packet forwarding both from & to WLAN controllers.
- User traffic packet bridging to and from AP wired interface.
- 802.1q VLAN Tagging.

802.11 WLAN can be expected to provide an adequate service for low bandwidth applications which are tolerant of latency (up to 50ms). There is also a limit to the number of users that can simultaneously access a single AP. The available bandwidth is divided between the users associated to the AP.

WLAN use cases

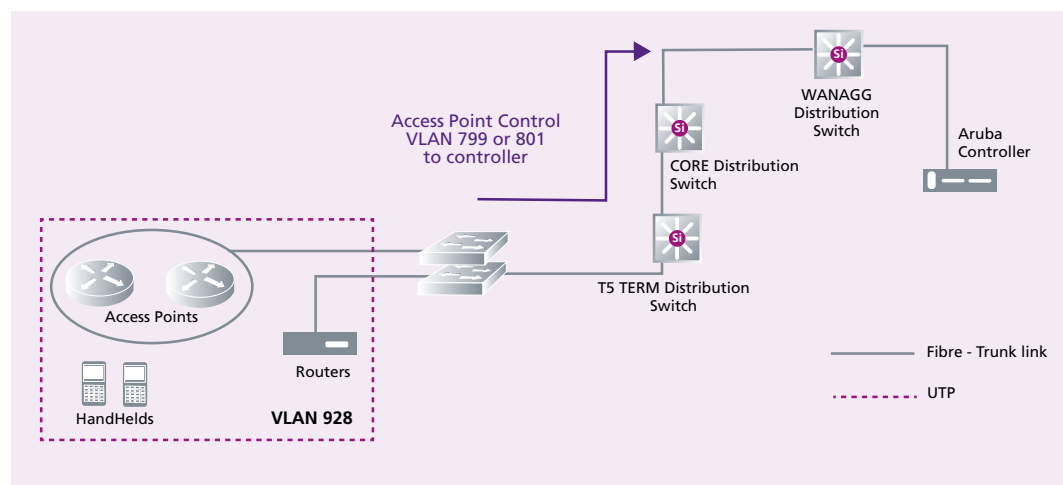
The following are actual use case examples of WLAN deployments that have taken place at Heathrow Airport. They will offer a flavour of the various types of WLAN infrastructure builds that are on offer and the diversity of work that can be achieved.

Bridged mode to Tills & PDQs in Retail Store – Terminal 5

In order to provide support to PDQs (Process Data Quickly) and hand held tills, a retail store recently used a wireless bridge mode SSID in its location. This allowed communication between PDQs and the tills network at layer 2 and provided a simple way to add wireless to their existing wired network.

The bridge mode deployment required a new Layer 2 VLAN and configuration of the existing APs within the confines of the store.

A topology diagram is provided:



The requirements for this deployment included:

- New bridge Mode WLAN SSID's generic to the retail stores use.
- 2 AP configurations.
- Connection to existing Layer 2 VLAN.
- Switch port configuration.

Conclusion

The SITA deployment team ensured that all configuration work is completed, in parallel to the onsite teams installation of devices and connection to all third party external back office servers.

End to end connectivity is verified with the SITA Technical teams and the Retail store IT teams which ensures PDQs and Tills are tested and confirmed working prior to the go-live date.

The Retail Unit has now been functional for approx 2 years with the WLAN solution creating a hassle-free working environment on top of a resilient, robust network. The unit is fully supported with any issues being resolved under a stringent set of Service Level Agreements (SLAs).

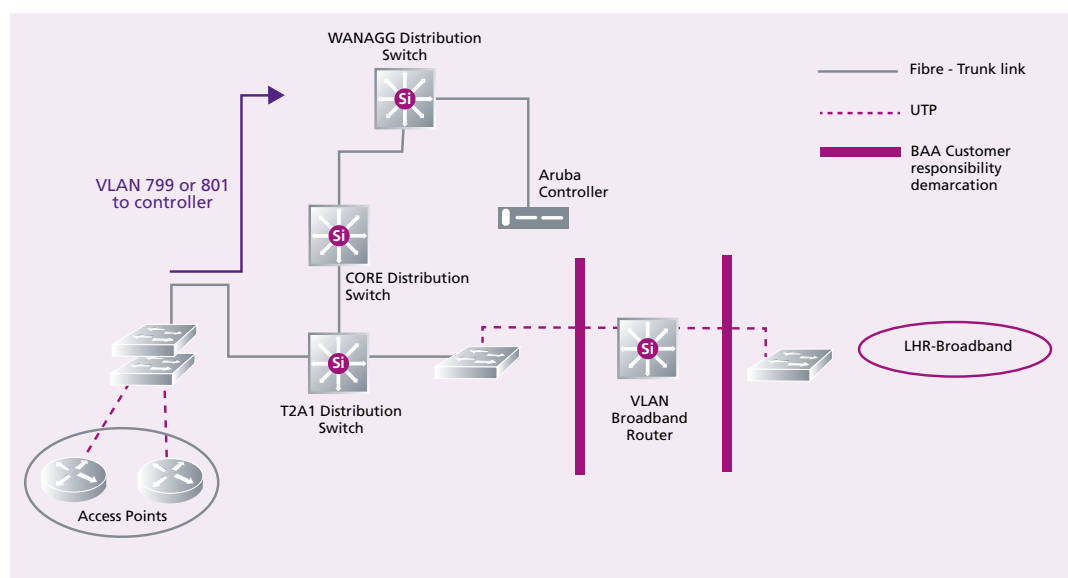
WLAN use cases

Airline Lounge - Terminal 2

Airport lounges have become a fundamental part of an airlines offer to its premium passengers prior to take off. As part of this, services such as free Wi-Fi are now expected, with the quality of access directly measurable against passenger satisfaction.

As part of the construction of Terminal 2, a particular airline took possession of an arrivals lounge in the T2A building. The lounge was fitted out with two Aruba APs to provide coverage to the area. The airline also requested their own SSID to provide an internet service for lounge users. The WLAN users bridged onto a local T2 Layer 2 VLAN, which connects to the airlines specifically provided router. The router will also have an LHR Broadband connection, which will act as the exit point for all WLAN users.

The Topology diagram for this deployment is as follows:



The requirements for this deployment included:

- One new WLAN SSID for the airlines T2A Lounge.
- The SSID was deployed onto 1 existing and 1 new Aruba 135 AP in T2A.
- A Managed LAN port for the connection to the airline router.
- Re-grouping of existing APs to new groups, which will encompass new SSID.
- Reconfiguration of access ports from access to trunk to allow airline bridged VLAN.

Conclusion

A full design is completed prior to the implementation, which specifies and sets out all the technical information that will be required. This includes such items as topology diagram, authentication method and logical configuration.

Once logical configuration and physical installation had been completed a full coverage WLAN survey is completed. This ensures that signal throughout the lounge was thorough and consistent with no drops in connection.

The lounge now has a fully monitored and supported WLAN network with passengers able to connect with their own devices. As well as that airline staff can now connect to their own dedicated network to aid day to day activities and any backend transactions.

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