

TECHNICAL SPECIFICATION

WIDE AREA MOBILE DATA (WAMD)

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INTRODUCTION

Heathrow has been the busiest international hub airport in the world for the past decades, handling more than 78 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, uninterrupted service. The IT infrastructure at Heathrow has been built to meet these challenging criteria's, 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.

The WAMD service provides a 4G coverage capability across the perimeter areas of the Heathrow Airport campus. This has made available a mission critical, high-speed mobile data network within the Heathrow airport perimeter, and has been designed to extend the service coverage of the Heathrow network to outdoor areas.

SERVICE OVERVIEW

The WAMD service is a campus wide broadband wireless network, using 4G technology to provide coverage capability across the external areas of Heathrow Airport. The service operates within a Virtual Private Network (VPN) between a Base Station Infrastructure and the core where it connects into the HAL WANAGG routers to provide 4G access for Heathrow Airport personnel and 3rd parties.

The service uses a third party 4G operator to deploy six dedicated 4G LTE (Long Term Evolution) base stations deployed within Heathrow and connected to an external LTE Evolved Packet Core network (EPC) and then back into Heathrow.

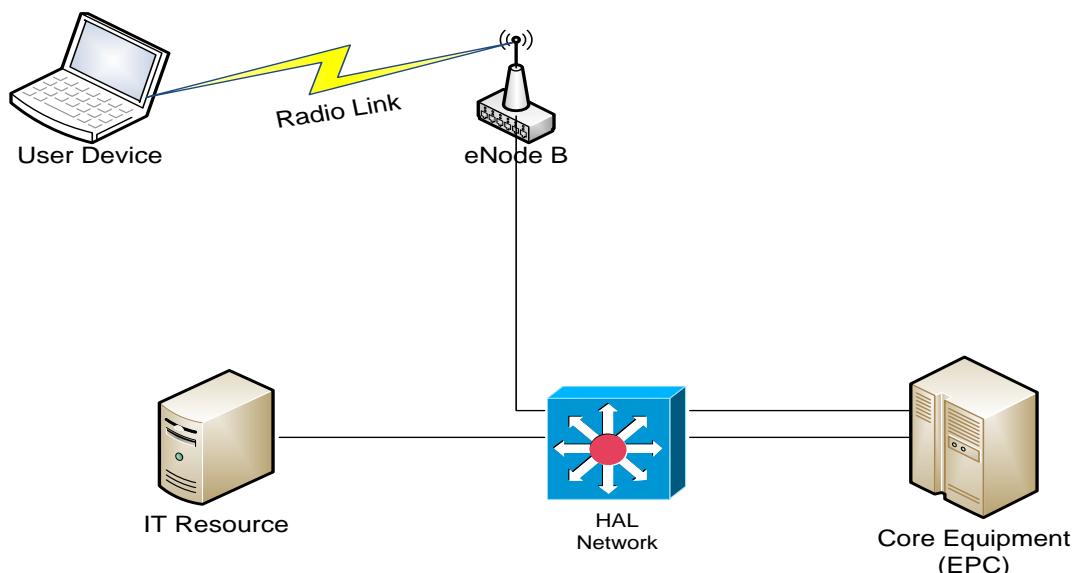
The solution uses the HAL LAN to connect the onsite LTE base stations to the off site EPC. The solution has been chosen to provide a campus mobile data network based on the LTE standards and using the 3.5 GHz frequency band.

A number of functional requirements have been incorporated into the system including:

- The system is designed to ensure it is available 24 hours a day, 7 days a week
- The solution is designed with built-in resilience.
- The solution will integrate with the existing Heathrow IP infrastructure
- The solution is capable of a peak upload of 2Mbits/s and peak download of 20Mbits/s for the overall system.
- The service is capable of providing individual channels to users
- The solution will segregate customer data into individual VLANs with no access to unauthorised data.
- The solution will allow specific users to have priority. The solution will provide in excess of 95% coverage to external locations such as: Runways, Taxiways, Stands, Forecourts, Airside and landside road, All outdoor locations within the Heathrow Airfield Boundary/Perimeter fence
- The solution is compliant with Heathrow Standards

HIGH LEVEL DESIGN

The operational model will provide the capability using 3rd Party LTE core network with base stations deployed at Heathrow to provide the radio access coverage. Interconnection between the system elements is provided by the HAL network; see the Heathrow 4G high level architecture below.



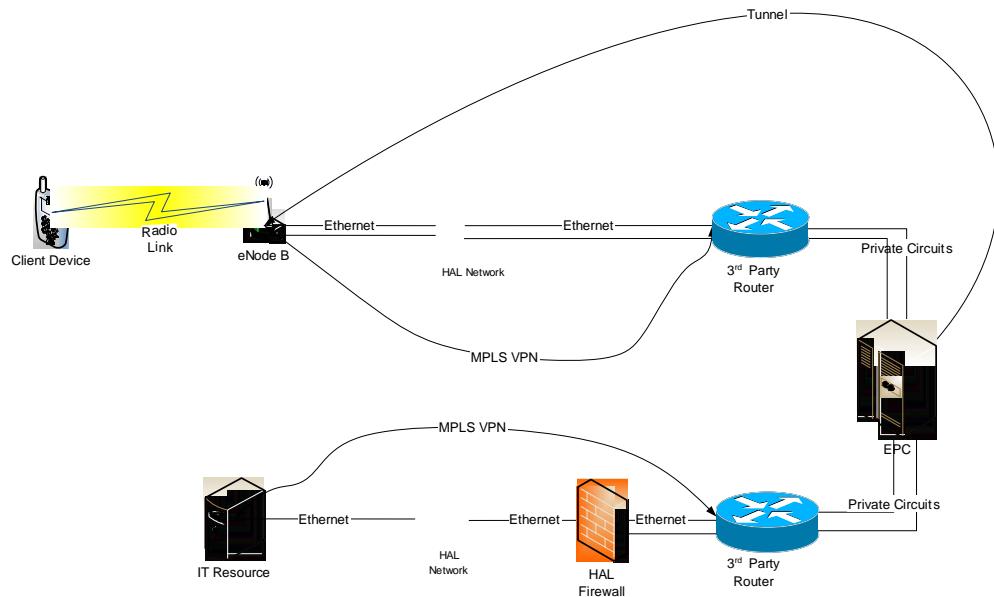
The Heathrow WAMD 4G system consists of the following five elements:

- End User Client devices – the end user devices (EUD) will vary from handheld to “customer premises equipment (CPE), to LTE dongles. The actual EUD used will depend on the service being delivered and as such is part of a parallel service implementation project to be defined.
- eNode B (eVolved Node B)– this is the base station deployed at a transmit site. It connects to, and is controlled by the EPC. It is located on Heathrow campus
- HAL network. The HAL MPLS (Multiprotocol Label Switching) network is used to interconnect the various components of the Heathrow 4G network.
- Core equipment EPC (Evolved Packet Core) this is the LTE core network equipment that controls the LTE system, and provides the connection between the end user device and the external network. All EPC elements are located off site at 3rd Party premises.
- IT resource The IT resource refers to the termination of the service being offered, currently all services proposed for the Heathrow 4G system are based within the HAL LAN.

The Heathrow 4G (LTE based) architecture is designed to pass all traffic generated at each eNodeB through a centralised evolved packet core (EPC). Given that the traffic destination for Heathrow 4G is currently identified to offer services which are located within the HAL LAN then traffic is considered as “intranet based” rather than “internet based”, the EPC egress traffic is therefore passed back down the same back haul circuit into a service demarcation port on the HAL LAN.

The traffic presented to the LTE modem/end user device within the LHR campus will be directed securely through the eNode B's and into the EPC to a dedicated Access Point Name (APN) in the external 3rd Party infrastructure.

Traffic will then be presented back at the handoff point over a private Layer 3 VPN for SITA to direct around the LHR LAN. End to end data path can be seen in the figure below.



SCOPE OF SERVICES

In order to satisfy the business requirement SLAs (service level agreements) for this service the radio subsystem deployment at the Heathrow campus provides a high degree of redundant coverage. This means should a failure of a sector or an entire eNode B occur on site, this will result in service degradation in a particular coverage area rather than a complete service failure. This results in lower bandwidth but not necessarily a denial of service

The Base stations (eNode B) are responsible for connecting the end user device to the LTE core network and they comprises of a Remote Radio Unit (RRU) and a BaseBand Unit (BBU).

The service as mentioned uses a third party 4G operator to deploy six dedicated 4G LTE base stations deployed within Heathrow and this allows traffic to connect to the UK Broadband Evolved Packet Core network (EPC) and then back into Heathrow.

The Heathrow 4G network has been designed to provide an agreed capacity and coverage based on the deployment from these 6 three sector eNodeB macro sites This provides the ability to offer an edge of network for the site of an uplink speed of 2 Mbits/s and a downlink speed of 20 Mbits/s.

4G CPE (CUSTOMER PREMISES EQUIPMENT)

WAMD has been chosen to provide a campus mobile data network based on the LTE standards and using the 3.5 GHz frequency band.

The Heathrow 4G network uses the 3.5 GHz spectrum and consequently the consumer devices currently available are not compatible with this frequency band. What this means is that whilst this provides a natural barrier to unauthorised personnel access to the system, it also means that access to the Heathrow 4G system can only be via specific devices.

Access of current consumer devices will therefore only be possible via an intermediary device. These devices will help provide the connectivity that is required and allow integration with the customer network. 4g receivers, modems, access point, dongles and SIMs all constitute to providing an end-to-end service, and all these are devices will operate under a full supported and managed service where customers will be provided with the equipment and SIM cards

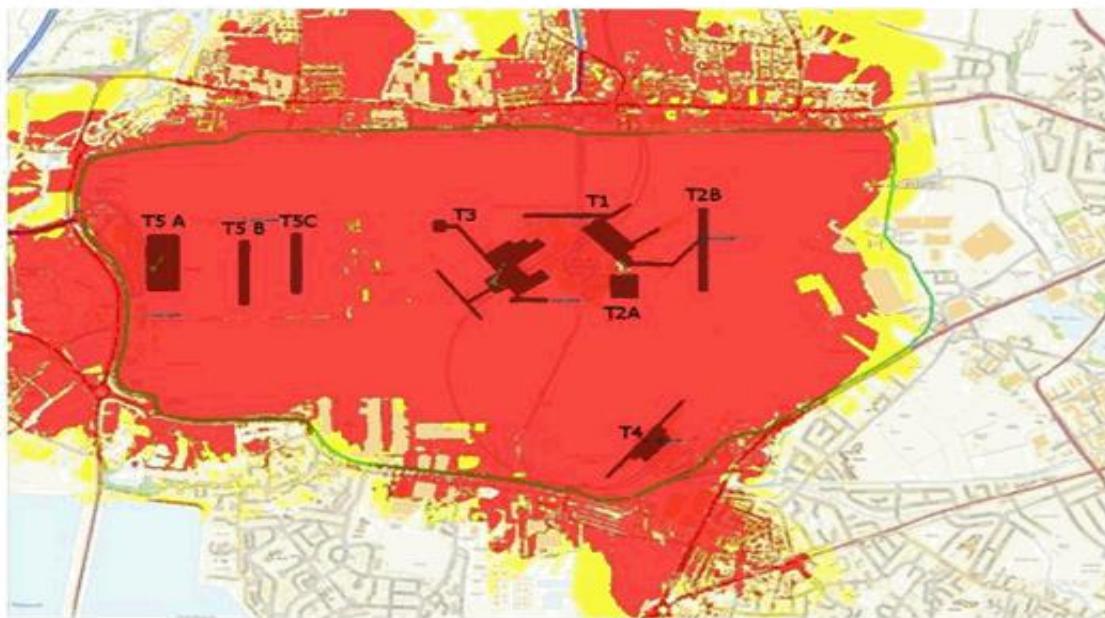
Below is a diagram showing how these units will connect to your specific access point in a vehicle or network switch in a building.



HEATHROW 4G OPERATIONAL SERVICE

The Heathrow 4G service has provided coverage up to the Heathrow airfield boundary fence and has been specifically designed to operate within these boundaries and not leak out anywhere past that.

The heatmap you can see below depicts the coverage across the campus which has given us those speeds as mentioned before, a capacity at the cell edge of 20Mbps download and 2Mbps upload (red) for a vehicle mounted device. The yellow coverage depicts the cell edge capacity at 1Mbps upload.



Those speeds that are being received, compares and exceeds to the existing 4G networks.

- Outdoor, airport-wide mobile data access through LTE bands 42 and 43 (3.5GHz and 3.6GHz).
- Operational, business-critical service with coverage and system availability designed for the Heathrow Campus
- Public systems are designed to provide maximum download capacity, Heathrow's 4G is focused on upload
- Designed for 20 Mbit download and 2 Mbit upload at the edge of cell
- Complements areas where Heathrow's Wi-Fi is not currently being provided
- System is designed to grow with demand
- Predictive coverage for the vehicle-mounted devices:

SUMMARY

WAMD provides a high speed mobile data network, with traffic and data specific to your individual service, connecting and working seamlessly to your existing managed network solution at any location that is required.

With many customers spread across the airport this type of connection offers flexibility and effortless communication campus wide and with predominantly all of the end to end connection managed and supported by SITA, this has now offered customers' peace of mind knowing that their service availability will remain constant at all times.

- Designed for professional use only
- Coverage and capacity for external areas of campus
- Access limited to registered users only
- Assessed for security, robustness and future growth
- Guaranteed availability – especially even at critical times
- Operational 24 x 7 with 4 hour return to service
- Integrated to current support systems and processes