Global City Wi-Fi Roaming

2019 Q1 Edition Report

WIRELESS BROADBAND ALLIANCE
DRIVING NEXT WIRELESS EXPERIENCE

TORONTO

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BIRMINGHAM
BRADFORD
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HOKKAIDO
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TRONDHEIM

MOSCOW

BRISTOL

NAGANO

SENDAI

KNOXVILLE

SAINT-PETERSBURG

TOKYO
KYOTO
KOBE

MALLORCA

City Wi-Fi Roaming Project connects the networks of major cities around the world...

POWERED BY
WORLD™ Wi-Fi Day

Interconnectivity partners

BSG WIRELESS | global reach | syniverse | Accuris NETWORKS

Operators

AT&T | boingo | ER-TELECOM | T··Mobile | eduroam Norway | eduroam Japan | eduroam Netherlands | ANYROAM

Infrastructure providers

CISCO | aruba a Hewlett Packard Enterprise company | RUCKUS an ARRIS company

WBA City Wi-Fi Roaming Trial

The Wireless Broadband Alliance (WBA) developed a City Wi-Fi Roaming Trial for the third consecutive year. The City Wi-Fi Roaming project is part of the World Wi-Fi Day initiative to accelerate affordable wireless connectivity around the world. The initiative allows consumers and visitors of major cities to automatically and securely roam between the public Wi-Fi networks.

The City Wi-Fi Roaming trial aims at promoting and fostering the adoption of Next Generation Hotspot (NGH) across the globe. These initiatives deliver a fully operational NGH Wi-Fi network on a grand scale in partnership with City authorities, operators, technologies players, roaming hubs and key venues, which raise participation numbers by a very large margin.

The latest trial facilitated by the WBA, and in conjunction with world leading operators, including AT&T, Boingo Wireless, ER Telecom and T-Mobile US, enabled citizens, travelers and end-users to automatically and securely roam between public Wi-Fi networks over 20 major cities around the globe, throughout October and November in 2018.

The trial was run over Next Generation Hotspot (NGH) with Wi-Fi featuring Passpoint TM technology based on Hotspot 2.0, in combination with the WBA WRIX (Wireless Roaming Intermediary eXchange) Framework for best in class Wi-Fi Roaming experience.

Trial Objectives

The City Wi-Fi Roaming Trial initiative has been developed to explore essentially two different sides of the equation: the technological enablement and the business standpoint.

Technological engagement perspective: the collaboration among cities, operators and roaming hubs worked together to deploy NGH in public networks and enable the best seamless and secured roaming experience to the City visitors.

Business and commercial perspectives: the trial aims to foster and encourage the adoption of NGH, given its total alignment with what the WBA believes is the future of Wi-Fi: a seamless, interoperable and secure experience across networks.

The key objectives of the Trial were:

Actualize the seamless Wi-Fi Roaming based on Passpoint TM (Hotspot 2.0) as well as EAP Technology for extra security and better user experience

Showcase seamless and automatic roaming for city visitors and travelers across Cities Wi-Fi hotspots

Engage the local cities, government bodies around Next Gen Wi-Fi benefits and foster live deployments

Benefit customers, events attendees and citizens while offering the seamless and secure Wi-Fi experience.

Demonstrate the WBA WRIX which is built upon a modularized set of standard service specifications to facilitate commercial roaming between operators

Promote World Wi-Fi Day with City Seamless Wi-Fi Roaming

What's Next Generation Hotspot (NGH)?

NGH works collaboratively with PasspointTM technology to streamline network access in hotspots and eliminate the need for users to find and authenticate a network each time they connect. It accomplishes this by offloading to carrier-grade Wi-Fi networks without user intervention. In a nutshell, NGH creates a truly ubiquitous connected experience, removing the pain of logins, passwords, and other user headaches so that you can enjoy a seamless, automatic Wi-Fi connection.

Network discovery, identification, connection, authentication and security are all key for the seamless integration of Wi-Fi and cellular networks. NGH provides clear security benefits, providing an automatic, encrypted connection. With several IEEE 802.11 security features, NGH also transforms the security position of devices connected to hotspots with guaranteed mutual authentication and over-the-air encryption, as well as peer-to-peer traffic.

In an effort to further bolster the expansion of NGH in the wireless ecosystem, the NGH trials include testing and further validation of additional devices that declare themselves Hotspot 2.0 (HS 2.0) compliant . The trials are achieved with the use of the WBA's Wireless Roaming Intermediary eXchange (WRIX) specification, in areas such as authentication, financial and data clearing, invoicing, security and automation. These standards combined deliver a mechanism to securely and seamlessly provision HS2.0 profiles to devices allowing them to connect based on defined operator/ service provider policies (Mobile Operators, Cities, Airline Companies, etc.). NGH framework make the Wi-Fi user experience as easy, seamless and secure as a cellular experience. NGH takes the established hotspot model and builds new levels of ease of discovery, security of connection and efficiency of service, leveraging the...

Wi-Fi Alliance's Hotspot 2.0 specification:

When a HS2.0 capable Wi-Fi device comes within the range of a HS2.0 capable access point, it will automatically start a signaling exchange with that access point to determine its capabilities. Some of the data that is exchanged may include:

- **The name of the Wi-Fi network operator / service provider**
- **List of roaming partners that are supported**
- **Other things related to the service, such as backhaul bandwidth, current load etc.**

The device is able to use this information to automatically decide whether to connect to a particular Wi-Fi network, e.g., in preference to possibly other overlapping networks.

Why investing in Next Generation Wi-Fi

During 2018, the WBA has run a Wi-Fi Roaming Survey to Operators in order to access what are their present perspectives in terms of Next Generation Wi-Fi adoption, goals, why investing and barriers to be overcome.

Top 5 reasons to invest in NGH:

To enable seamless access across different Wi-Fi networks **(65%)**

To enable seamless access between Wi-Fi and licensed networks **(54%)**

To reduce operational costs by offloading from licensed to Wi-Fi networks **(42%)**

To increase revenue opportunities through new consumer services **(58%)**

To improve the customer quality of experience and overall satisfaction **(50%)**

WBA Wi-Fi Roaming Framework

WBA Is a set of service specifications published by the WBA to provide a framework for Wi-Fi interconnection, data clearing, financial clearing and the exchange of Wi-Fi location information between Service Providers. The purpose of the service specification is to standardize both technical and business processes between Wi-Fi Roaming Partners.

WRIX is comprised of the five specifications listed below and the recommendation is for Service Providers to utilize all five of the specifications. However, it is acceptable for different partners to utilize the specifications only as guidelines, or part of it, when creating and maintaining Wi-Fi Roaming partnerships. Specifications available:

WRIX-n: Network Level Functions

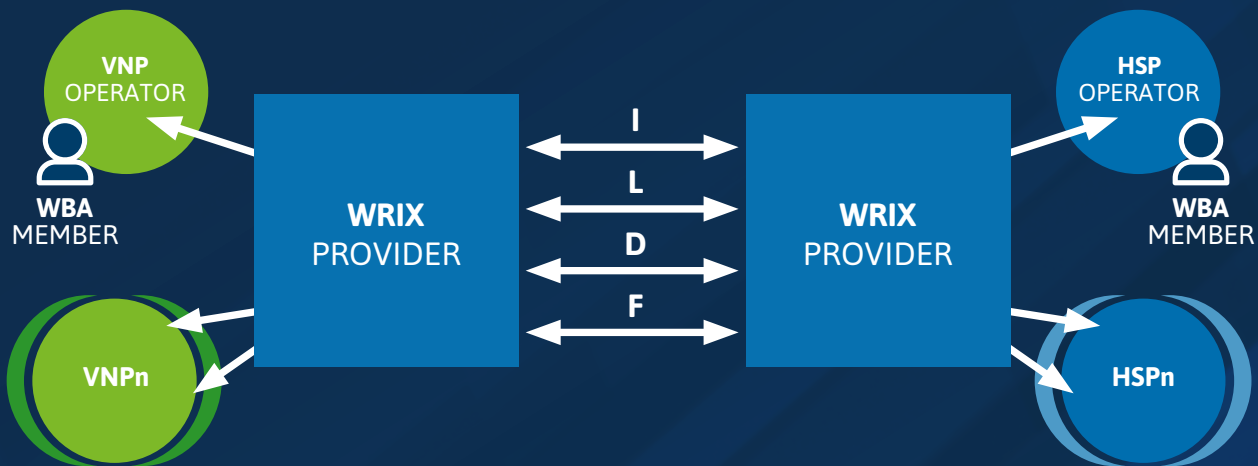## WRIX-i: RADIUS Interconnection Specifications

WRIX-d: Data Clearing Specifications

WRIX-f: Financial Settlement Specifications

WRIX-L: Locations Feed Formation and File Exchange Specifications

VISITED NETWORK PROVIDER	HOME SERVICE PROVIDER	
Network Configuration		**WRIX-N:** Network Configuration requirements and specifications
Mediate RADIUS Accounting	Mediate RADIUS Accounting	**WRIX-i:** Specifies guidelines for Wi-Fi roaming interconnection, including connectivity types, RADIUS requirements, session mediation and service levels
Collect RADIUS Accounting	Collect RADIUS Accounting	
Proxy Routing Mediation	Proxy Routing Mediation	
Extract the Financial Data		**WRIX-d:** Defines procedures for applying inter operator tariffs and data formats for file exchanges for usage validation and dispute resolution between roaming partners
Wholesale rating	**Validation**	
Invoice Production	Financial Payment Settlement	**WRIX-f:** Financial clearing specification. Covers the financial data handling, invoicing, payments and settlement
Financial Settlement	Financial Settlement and Reconciliation	
Financial Data Handling	Financial Data Handling	
Exchange of WRIX Location info, Database and ID	**Exchange of WRIX Location info, Database and ID**	**WRIX-L:** Location Feed Format and File exchange Standard

Network Configuration

4

Setup steps

VNP
OPERATOR

WBA
MEMBER

WRIX
PROVIDER

I
L
D
F

WRIX
PROVIDER

HSP
OPERATOR

WBA
MEMBER

VNPn

HSPn

Step 1 | CONFIGURATION & INTERCONNECT

Availability of Passpoint / Next Generation Hotspot (HS2.0) infrastructure
for Access Points and controller

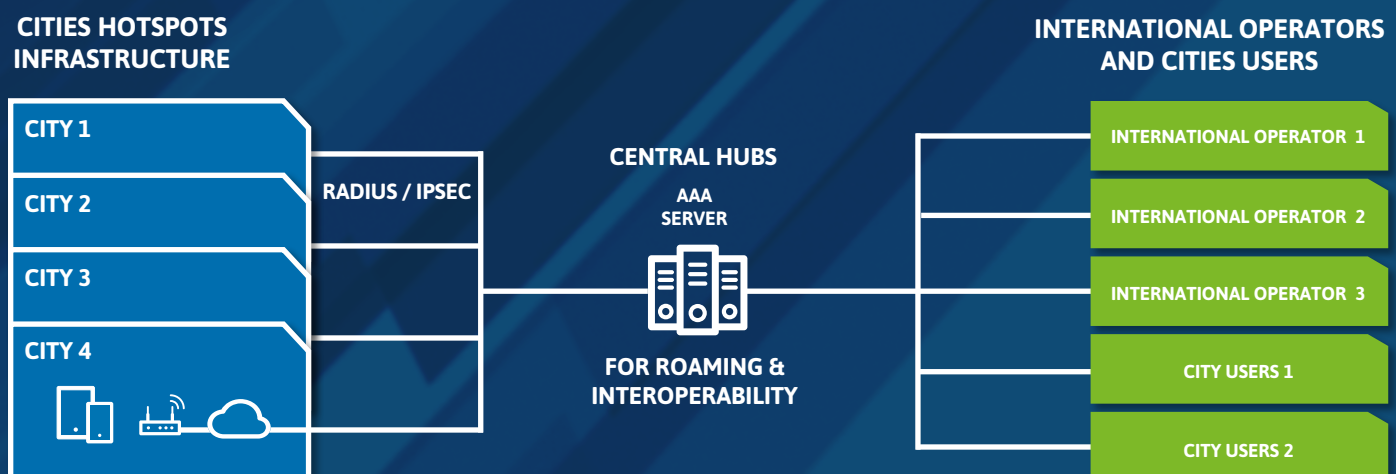Interconnect infrastructure through AAA server with a Roaming Hub

Provide and configure the name of Wi-Fi Realms or alternative information
to load in ANQP Server, for NGH auto network discovery and selection
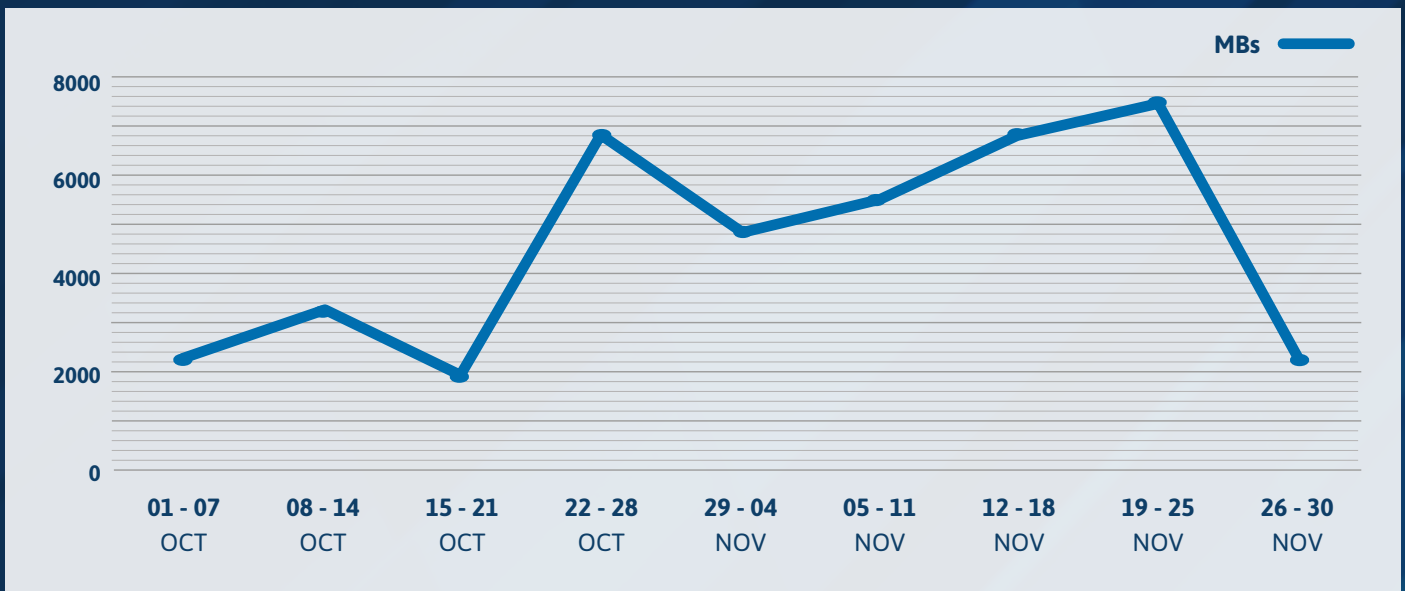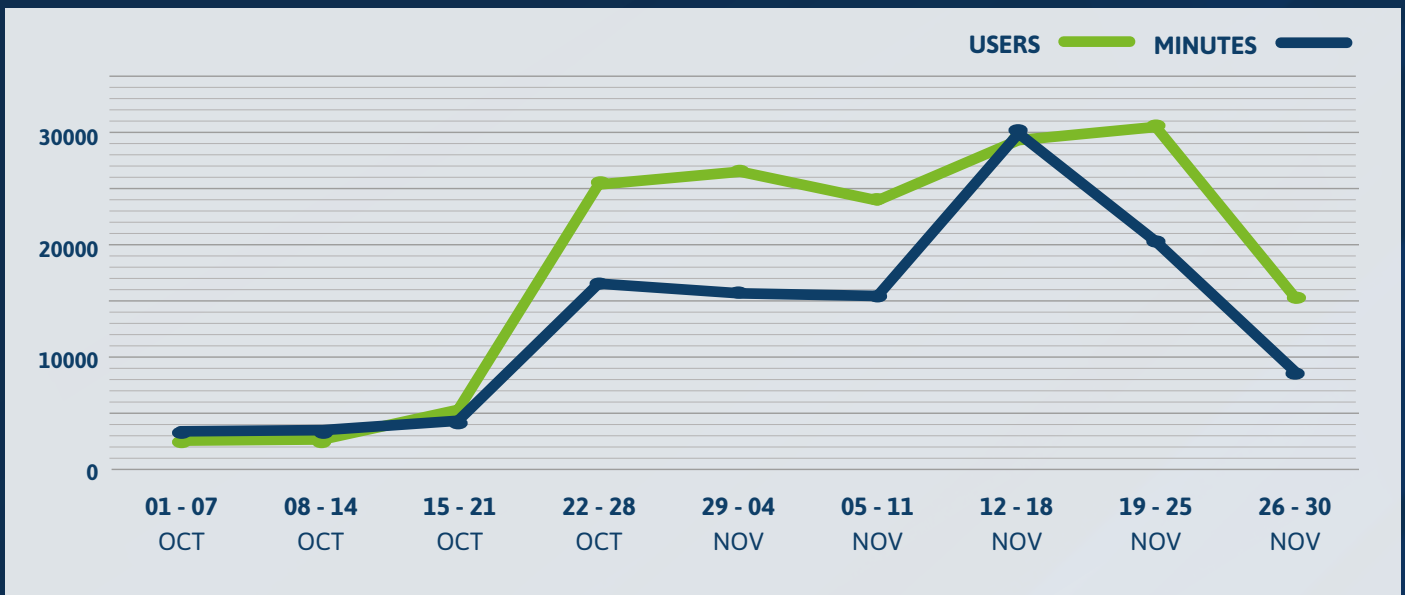
Step 2 | ROUTE AUTHENTICATION REQUESTS

Allows RADIUS authentication requests from credentials of other networks
(operators and /or cities) to be routed to the Roaming Hub AAA Server

Step 3 | GRANT ACCESS TO INTERNET

Once users are authenticated allow those sessions to get access to the internet

CITIES HOTSPOTS INFRASTRUCTURE

CITY 1

CITY 2

CITY 3

CITY 4

RADIUS / IPSEC

CENTRAL HUBS

AAA
SERVER

FOR ROAMING &
INTEROPERABILITY

INTERNATIONAL OPERATORS AND CITIES USERS

INTERNATIONAL OPERATOR 1

INTERNATIONAL OPERATOR 2

INTERNATIONAL OPERATOR 3

CITY USERS 1

CITY USERS 2

Statistics From The Trial
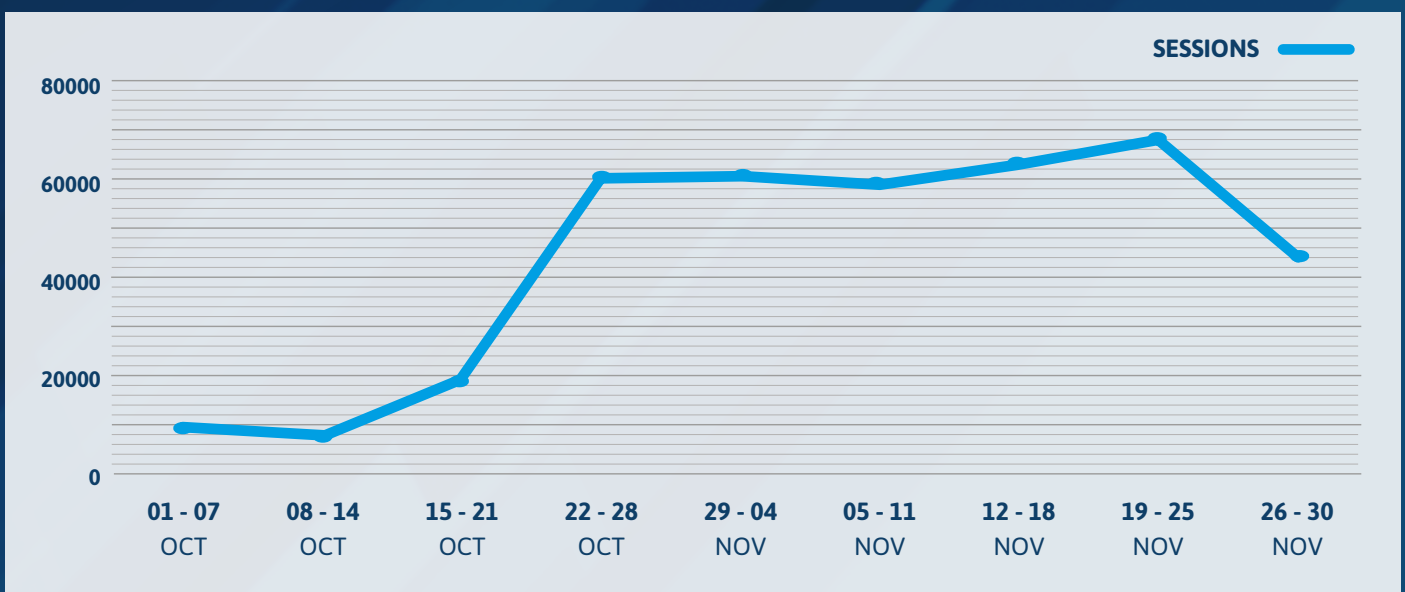
What's Next

WBA Roaming Federation

Wi-Fi Roaming HUBs

STAKEHOLDERS

Roaming HUBs • Operators • Cities • Shopping Malls and Chains • Infrastructure Vendor • Hospitals & Healthcare • Stadiums • Hospitality • Schools & Universities

INFRASTRUCTURE PROVIDERS

- Creation of a Global WBA Roaming Federation to interconnect Venues, Cities, Enterprises and Operators across the world.

- Extend the City Wi-Fi (NGH) Roaming Trial to test the Roaming Federation OI.

- Start with NGH based on Passpoint but over time evolve to other technologies such as RadSec, and eventually to a PKI Certificates dimension.

GOALS

- Facilitate Wi-Fi interoperability & roaming across all Wi-Fi NGH networks.
- Create Global WBA members Roaming Federation open to all type of stakeholders.
- Accelerate deployment of NGH-Passpoint.
- Increase Roaming Traffic and generate more business to all stakeholders.
- Engage all types of stakeholders (Cities, Operators, Enterprises).

WBA WORK GROUPS & PROJECTS

NextGen Work Group	5G Work Group	IoT Work Group	Roaming Work Group	Testing & Interoperability Work Group
Wi-Fi 6 (802.11ax)	RAN Convergence (NGMN JTF, Roadmap)	Deploying Wi-Fi and LoRa (Same infrastructure)	Roaming Evolution (Federation, Interconnect)	Captive Network Portal Standards for Wi-Fi
In-Flight Connectivity	Multipath Technologies	Connected Car	NGH Live Initiatives	NGH Provisioning Standardization & Trial
In-Home Wi-Fi / Wi-Fi Sensing	Fixed Wireless Access		Security & Privacy over Wireless Networks	

WBA KEY ROLE

Fast-tracking Wi-Fi deployments for operators	Leading convergence of Wi-Fi with 5G	Augmenting Wi-Fi role in IoT	Incubating new business opportunities	Achieving interoperable Wi-Fi services

GET INVOLVED NOW

Email: pmo@wballiance.com

Or click the button to

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