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Neutral Host Solutions for 5G Multi-Operator Deployments in Managed Spaces

Innovation to lower the cost of capacity and coverage for 5G and existing radio technologies.

Abstract

In a neutral host architecture, a shared wireless infrastructure is created which is used to provide services to end-users with subscriptions to several different hosted operators. Neutral host scenarios are particularly attractive in dense small cell deployments (as may be required for 5G mmWave service) which may require capital intensive buildouts and cumbersome backhaul and cell site infrastructure requirements. For example:

- Intercell distances for these deployments are in the order of 100's of feet. It may be impractically expensive for all mobile operators serving a specific area to fully deploy a dense small cell network in the same location or venue.
- In outdoor small cell deployments, local regulations may constrain how much infrastructure can be deployed. For example, there may only be physical space available for one antenna assembly at optimal small cell locations even though there may be many different operators interested in deploying in that location.
- Many indoor locations and venues are managed by a separate enterprise which may want to deploy their own small cell (e.g., Wi-Fi) network and may find it burdensome to work with and integrate access capabilities for the multiplicity of mobile/wireless operators that are serving the general area.

However, by utilizing a neutral host architecture, many different operators are able to share a common buildout provided by a neutral host provider.

Although neutral host architectures have been deployed with existing Wi-Fi and 4G technologies, the high performance promised by 5G mmWave access has sparked new interest in these architectures. With the introduction of 5G services and the system architecture evolution to Network Functions Virtualization/Software Defined Networking (NFV/SDN), the cost efficiencies of deploying 5G services may be leveraged by a neutral host service provider to provide tailored and differentiated services blended with services offered by Mobile Network Operators (MNOs) and to maintain continuity of these services within the coverage area of the neutral host.

A neutral host deployment can provide cost effective coverage and capacity for wireless environments such as dense metropolitan areas, enterprises, campuses, entertainment venues and shopping malls. This document assessment defines the neutral host concept and provides an overview of the technical solutions to support neutral host.

Foreword

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1 Scope, Purpose, & Application

Today, when deploying small cells within a managed space such as an enterprise office, a shopping mall, or a stadium, the landlord controls access to infrastructure. Visitors to the space will subscribe to many different wireless network providers. Thus, to get uniform cellular coverage for all employees, customers and guests, small cells from all major providers must be deployed in addition to Wi-Fi and other unlicensed access technologies.

Furthermore, 5G mmWave technologies will often be deployed in dense configurations to provide adequate coverage given the Radio Frequency (RF) propagation challenges in mmWave spectrum. Similar to managed space environments noted above, it is likely that all major providers will need to deploy in the same areas. Particularly in outdoor deployments, infrastructure and regulatory constraints may limit the number, and location of cell site placement.

These scenarios represent a high-cost and complex arrangement involving deployment of multiple infrastructures. A potentially more attractive arrangement is to have one common infrastructure system deployed that could be used by all service providers. Thus, a third-party provider (such as an independent access provider, a landlord, or delegate) becomes a neutral (not aligned with any specific provider) host for small cell coverage.

This paper examines and analyzes neutral host solutions assessing the technical and logistical implications.

2 Normative References

The following references contain provisions which, through reference in this text, constitute provisions of this document. At the time of publication, the editions indicated were valid.

[017 Market Drivers for Small Cells] Small Cell Forum SCF017.06.01, *Multi-operator market drivers*[1]

[22.261] 3GPP TS 22.261, *Service requirements for next generation new services and markets*[2]

[22.951] 3GPP TS 22.951, *Service aspects and requirements for network sharing*[3]

[23.251] 3GPP TS 23.251, *Network sharing; Architecture and functional description*[4]

[23.402] 3GPP TS 23.402, *Architecture enhancements for non-3GPP accesses*[5]

[23.501] 3GPP TS 23.501, *System Architecture for the 5G System*[6]

[MulteFire] MulteFire Alliance[7]

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[1] Available from the Small Cell Forum at: < http://scf.io/en/documents/017_-_R6_-_Multi-Operator_Market_Drivers.php >.

[2] Available from 3GPP at < http://www.3gpp.org/DynaReport/22261.htm >.

[3] Available from 3GPP at: < http://www.3gpp.org/DynaReport/22951.htm >.

[4] Available from 3GPP at: < http://www.3gpp.org/DynaReport/23251.htm >.

[5] Available from 3GPP at: < http://www.3gpp.org/DynaReport/23402.htm >.

[6] Available from 3GPP at < http://www.3gpp.org/DynaReport/23501.htm.>.

[7] See: < http://www.multefire.org/ >.