Wireless 20|20

The Business Case For MulteFire Technology

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INTRODUCTION

As the mobile industry continues to develop at breakneck speed, new technologies, implementations, spectrum uses and products are being developed to support new user and operator requirements and use cases. One of the most important new developments is the emergence of MulteFire™ technology which allows the implementation of LTE™ technology in unlicensed and shared spectrum bands. This combination enables many new use cases for LTE technology, taking advantage of the benefits and low cost of LTE technology deployment beyond the typical licensed spectrum bands supported by large Mobile Network Operators (MNOs). New players can find innovative ways to create new opportunities and business models, and existing mobile operators can find ways to use the new spectrum to support their existing customers with even more capacity. With these unique capabilities, MulteFire can play a key role to meet the ever-expanding demand for new mobile capacity and capabilities. In addition to the key benefits that MulteFire provides from an implementation and technology strategy standpoint, MulteFire also provides significant economic advantages from cost savings and revenue opportunities.

This white paper will consider the key technical capabilities delivered by MulteFire and address the economic impact afforded by those capabilities. While there are many potential use cases for MulteFire, here we will focus on two examples of use cases:

- Private IoT Network deployment in a harbor
- Enterprise office building deployment of MulteFire small cells

These examples are typical use cases where the technical capabilities of MulteFire create opportunities for new business models, and offer the potential for cost savings over current implementations. Each of the use cases has been analyzed using the Wireless 20/20 WiROI™ Venue Business Case Tool to examine the detailed costs and potential revenues associated with a deployment of MulteFire. The paper includes a financial analysis of the two use cases, and shows the areas where MulteFire can provide an economic advantage. Based on the results from the modeling, MulteFire can offer 50-75% savings over other technologies that could be used in these use cases.

WIRELESS NETWORK TRENDS

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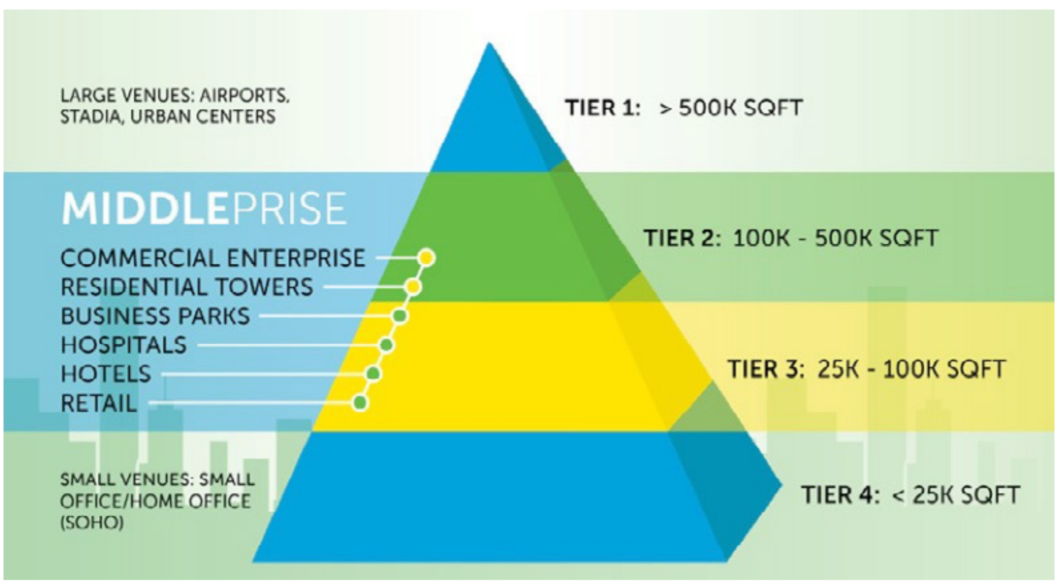
In the in-building market, it is increasingly critical that residents, visitors and workers have access to reliable coverage. In many cases, the presence of a strong and reliable mobile signal could be the difference between renting an office or apartment, or not. Lack of adequate wireless connectivity can lead to increased vacancy rates and lower property values. But as more environmentally-friendly buildings are developed built to LEED standards and coated windows that improve environmental performance are added to existing buildings, it becomes more difficult to provide quality wireless coverage from outside macro networks.

Also, as many companies transition to a BYOD (Bring Your Own Device) model, robust mobile service becomes a critical business tool in today's office environment. While people have grown reliant on connecting to cellular networks wherever they go, only 30% of small and medium-sized businesses believe their in-building coverage is sufficient to handle rapidly growing volumes of mobile traffic. The underlying message: Indoor cellular connectivity is not an amenity. It is an absolutely essential utility like heat, light and electricity.

These trends have pushed mobile operators to invest in larger, high-profile venues like stadiums, large commercial buildings and airports. But many small and medium-sized venues that are still seeking a cost-effective solution, far outnumber the larger venues. And since the profile of the workers in these buildings likely mirrors the market share of the major operators in that market, having the capability to support multiple operators from one infrastructure of small cells in a building becomes critical. By using a neutral unlicensed spectrum band, MulteFire can support these key requirements. This can enable a building owner, enterprise tenant, or neutral host operator to pursue a business model of their choice with the lowest possible cost basis to meet their requirements.

Figure 1



Source: SOLiD and Wireless 20/20

The Private IoT network deployed in a harbor is an example of a closed network that takes advantage of the capabilities of LTE delivered over unlicensed spectrum. The harbor application is a good example of emerging Industrial IoT applications. In a modern harbor, more and more devices are being added to track goods and containers, provide safety and environmental information, and monitor transportation networks within the harbor. These elements are becoming critical to the development of modern harbor facilities, increasing the efficiency of operations to support increasing port traffic and give stakeholders in the logistic chain better visibility. A high-performance and large-coverage wireless network like MulteFire is needed to provide this new backbone facility to develop next-generation harbor operations.

IMPACT OF MULTEFIRE TECHNOLOGY

MulteFire Technology delivers Wi-Fi-like simplicity in deploying Private LTE networks standalone in unlicensed spectrum such as the global 5 GHz band. It is designed to enable enhanced coverage, improved capacity, seamless mobility and a future-proof technology for self-organizing, hyper-dense small cell deployments.s.

By focusing on unlicensed spectrum, MulteFire enables the flexibility to deploy a network without dependence or obligation to the MNOs. In addition, because the same frequency range can be used around the world, the use of MulteFire can be the same anywhere for a global organization. The capability to deploy your own network enables new applications and business models, without requiring investment in expensive licensed spectrum bands. In the harbor IoT network example, the port can deploy an LTE infrastructure focused on the required coverage for the port area, and deploy IoT sensors and trackers to implement the required applications to enhance port operations. In the in-building example, building owners, enterprise IT managers, or a neutral host can deploy MulteFire as a multi-operator network to support all occupants of the building, enhancing the value of the building, again without the commitment of the MNOs. By combining the enhanced performance of LTE with the deployment simplicity of unlicensed spectrum, MulteFire offers the best of both worlds, enabling enhanced broadband services in more places than ever before.

MulteFire also offers significant performance advantages which can enhance the use cases being studied here. Since MulteFire is based on LTE, it will operate in wider bandwidths (up to 20 MHz) to support high capacity and low latency, capable of peak data rates up to 400 Mbps (using 4x4 MIMO with 256 QAM). Furthermore, the standard allows multiple sub-bands to be aggregated to achieve even higher speeds. In the harbor use case, the Private IoT network must support thousands of devices over a wide coverage area. In the Port of Singapore example outlined in this white paper, the coverage area extends over seven kilometers. The longer range of MulteFire small cells compared to Wi-Fi means far fewer access points and a lower cost from a more streamlined network. Such a local LTE network utilizes dedicated radio equipment to service a premise with specific IoT applications and services. The use of dedicated equipment allows it to be independent of traffic fluctuation in the wide-area macro network. In addition to the performance capabilities, the built-in security features of LTE help to support secure harbor operations.

In the enterprise use case example, a MulteFire network enables deployment of a single small cell network capable of supporting subscribers from all MNOs and roaming users. The single network allows the most economically efficient deployment, whether it is deployed by a building owner, one or more of MNOs, or a neutral host operator. The MulteFire Release 1.0 specification defines a Neutral Host access mode where the same network deployment can serve multiple operators, as well as a traditional access mode for a single network operator. Because it is an LTE network, MulteFire supports a range of LTE services, including voice and high-speed mobile broadband data. In either case, the lower cost basis afforded by MulteFire technology provides more and better options for business models that can make an in-building network deployment economically viable.

ECONOMIC ANALYSIS OF MULTEFIRE USE CASES

The analysis of the two uses cases in this paper focuses on understanding the economic impact of using MulteFire technology.

In the case of in-building wireless, DAS networks and small cells are the current technologies most likely applied to support networks for enterprise buildings, airports, stadiums, malls, and other high-end venues. The working assumption is that most venues require both Wi-Fi and mobile network infrastructure. But while DAS networks can support subscribers from multiple operators for the in-building mobile network, they are relatively expensive, and are difficult to implement economically in any venues except for the largest, with coverage area over 300-500K square feet. Small cells can be implemented effectively for a single operator. But if a separate parallel network needs to be deployed for each operator, the total cost would be even greater than a DAS network, and require a separate network and wiring be routed through the building to implement the single operator small cell implementation.

In this use case, there are economic advantages both in the cost and revenue side of the business model. Compared to existing solutions, a MulteFire in-building small cell network enables the deployment of a single network to support all operators. The resulting CapEx and OpEx savings is calculated here for the enterprise building example, 590 Madison Ave, located in New York City. However, similar savings would be found in other in-building networks. In addition to the cost savings, MulteFire networks enable new business models to monetize the network. A neutral host operator could implement a MulteFire network to support traffic for all operators, and develop roaming agreements with those operators to monetize the traffic they offload from the MNO's macro network. Building owners or enterprise tenants could also build MulteFire networks to provide support for users implementing innovative applications. The in-building use case analysis will quantify the savings on the cost aide of the equation, and estimate potential revenues to provide a positive ROI for a MulteFire network developer.

A MulteFire solution enabling the technical advantages of LTE in unlicensed spectrum also provides advantages in a Private IoT network. Here, the focus is more on the cost side of the equation. In the example of deploying a Private IoT network in the Port of Singapore, the key requirements are coverage over a wide area (a total of 20,000,000 m2) and provide connectivity for thousands of sensors and devices. Alternative solutions include either Wi-Fi networks or proprietary IoT networks. A MulteFire network can be deployed and controlled without concern for interfacing with an MNO or for interference from an outside network. A Private IoT MulteFire network can take advantage of the performance capabilities of LTE, for coverage, latency, and capacity. This Private LTE MulteFire network would require far fewer access points for coverage of a large port than a Wi-Fi implementation, leading to a much more cost-effective infrastructure. The broadband capability and QoS management capabilities of the LTE network enable new services to be added and managed, extending the life of the network, again maximizing the value of the CapEx investment. And the security capabilities of LTE enable the secure implementation required by an IoT application such as harbor operations. The analysis will quantify the savings for deployment, and the benefits in operations

USE CASE #1 - PRIVATE IoT NETWORK - PORT OF SINGAPORE

Definition of the Venue and the Use Case

In the Port of Singapore use case, the goal is to set up a network which covers the entire area of the port to support a number of advanced connected services. These operations will be critical to set up operational efficiency of the port for the next generation. Part of the challenge of the analysis is to determine what current and future functions could be supported currently, and might be in the future. Among the operations that might be supported could be:

- Asset tracking. Each container that is in the port has a sensor on it to provide its ID and location to allow all assets to be tracked in real time.
- Transportation and autonomous vehicles. Real time communication and planning for all transportation moving goods around the port.
- Environmental sensors. Weather and environmental sensors, air quality and toxic sensors could be spread around the port.
- Communications with arriving ships. An information connection would allow data and sensors from docking ships to share information
- Video and surveillance. A network of cameras could provide wide coverage video surveillance across the port to a central security facility.

Port of Singapore is one of the largest ports in the world, covering a vast area along 16 kilometers of the waterfront along Singapore Strait.

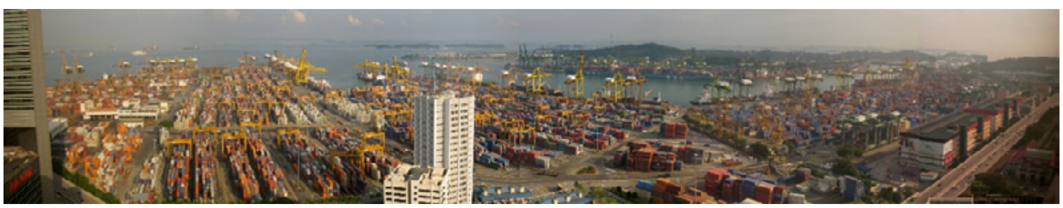


Figure 2

The port covers a vast area of 20 square kilometers, and supports 65 berths for docked ships. The port hosts 37,000 ships annually and over 32 million containers pass through the port.

One of the challenges of the analysis is to estimate how many IoT devices might be deployed across the port area, especially considering that it is not exactly known what kinds of future functions and applications might be necessary. The analysis develops an estimation based on the number of berths, number of boats in port, and the number of containers in port. Each berth might have a critical number of autonomous vehicles, programmable cranes, environmental sensors, and other automated sensors. If each boat is at the port for a day, that means about 100 boats a day may in port at any one time. Each boat could have informational or operational sensors associated which could communicate with the IoT network. If each container is in port an average of two days it would mean about 170,000 containers might be in port at any one time. Each container could have a device associated with it that contains ID information and position and status.

So the calculation for number of devices might look like

Number of Berths= 65 x 50 devices per berth= 3,250 devices

Number of Boats= 100 x 20 devices per boat= 2,000 devices

Number of Containers = 176,000 containers x1 device per container= 176,000 devices

Total number of devices= 181,000 devices

While some of the devices could be more complex devices that use much higher bandwidth, the majority of the IoT devices would be low-bandwidth devices. Overall the traffic model is estimating an average of about 20 Mbytes of information per device per month. These are all estimates, but provide a framework for estimating the device per traffic load for a port IoT use case.

Implementation of the Network

The requirements assumptions is that full coverage is required to connect with sensors across all of the area of the port. In addition, it is assumed that many of the sensors have low bandwidth requirements. Based on the current analysis of the network which is quite dense, the capacity of the proposed MulteFire network is not challenged, leaving lots of capacity available for new applications in the future.

Port of Singapore needs:

- Total coverage across 20 sq km (20,000,000 sq m)
- 65 berths
- 37,000 ships per year
- 32,200,000 containers per year
- Total of over 180,000 devices (phased in over the next 10 years) at the port for the range of applications outlined above.
- Network would be deployed by the port to assist, streamline and optimize port operations
- Network would be paid for and owned by Port of Singapore

Users of the network

- Port operations
  - Port would deploy as part of its core operational infrastructure
  - The hospital authority can be the NHN owner; They can also offload this authority to a system integrator, service provider, or MNO
- Port services subcontractors
  - Would be required to deploy compatible sensors and information devices as required by port operations
- Docked ships
  - Would be required to deploy compatible sensors as required for port interaction

Business model

- The business model for the Port private IoT network focuses on cost savings and operational efficiencies.
- In this analysis, there was no revenue consideration. In other IoT networks, there could be monetization strategies which could be pursued potentially.
- The model compares the cost for deployment and operation of a MulteFire small cell network vs. a Wi-Fi 802.11ac network to support the requirements of the network.

Key Functions of the Network

- Asset tracking. Each container that is in the port has a sensor on it to provide its ID and location to allow all assets to be tracked in real time.

- Transportation and autonomous vehicles. Real time communication and planning for all transportation moving goods around the port.
- Environmental sensors. Weather and environmental sensors, air quality and toxic sensors could be spread around the port.
- Communications with arriving ships. An information connection would allow data and sensors from docking ships to share information.
- Video and surveillance. A network of cameras could provide wide coverage video surveillance across the port to a central security facility.

Value Proposition for the MulteFire Network

- Cost savings, both CapEx and OpEx
- Large ecosystem of providers of networks and sensors which can build on the volume benefits of LTE technology
- Managed network capability to facilitate multiple functions and flexibility to expand network with new applications
- Network security to ensure key functions in the network
- LTE advantages for high performance, low latency, mobility and network capacity

Cost Structure

- Cost of the network deployment and operations
- Network equipment cost
- Installation, construction, commissioning labor
- Cost for backhaul equipment and installation
- Implementation of internet connection
- Cost for on-going maintenance of network
- Cost for utilities
- Assume no cost for site rental since port will own the network
- Assume cost of sensors would be the same for Wi-Fi or MulteFire so not included in this analysis

Revenue Streams

- There are no revenues associated with this case.

Cost-Saving Models vs Alternatives

In the Port of Singapore use case, the model is assessing the cost benefit of deploying a MulteFire network of small cells versus a network of Wi-Fi access points. Because of the 2X range benefit of the MulteFire cells, one would need 4 times as many Wi-Fi access points to cover the large area of the port area. With an assumption of a 200 m range for the MulteFire small cells, and 100 m range for the Wi-Fi access points, you would need 1027 access points to cover the required area versus only 257 MulteFire small cells. Although some of the MulteFire controllers are more expensive than those needed for Wi-Fi, and the units themselves are more expensive, the cost savings in the initial deployment adds up to more than 40% over a Wi-Fi deployment. It is assumed that the cost of sensors and other devices in the network would be nearly the same for Wi-Fi and MulteFire compatible units, so this has not been factored into the analysis.

Economic Analysis

Key Assumptions

Key assumptions	*MulteFire*	*Wi-Fi (802.11ac)*
Range	*200 m*	*100 m*
Capacity	*100 Mbps*	*75 Mbps*
Cost	*$3,000*	*$2,000*
Number of coverage units	*257*	*1027*

Similar costs are used for the installation cost and backhaul costs for both Wi-Fi and MulteFire.

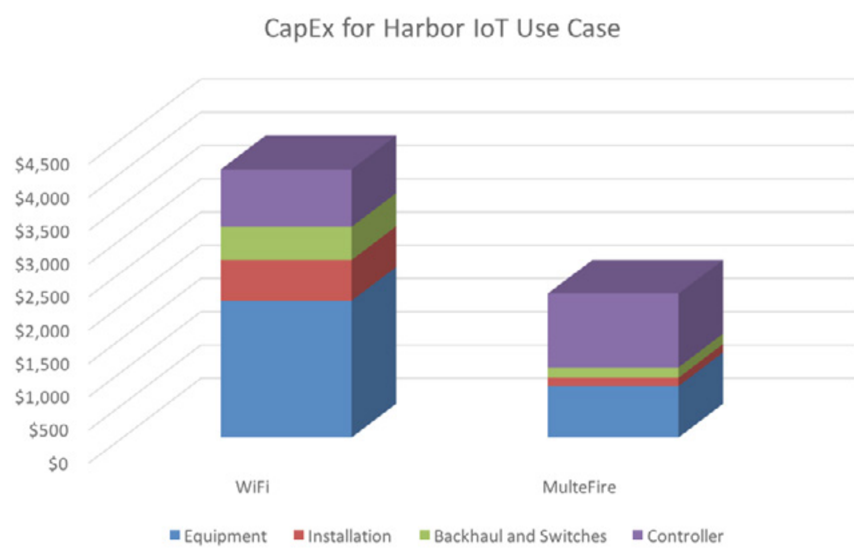


Figure 3
CapEx costs include the cost of the equipment, installation of the access network, cost of the backhaul, installation and commissioning of the backhaul, Network design and engineering, core network controllers, network commissioning.

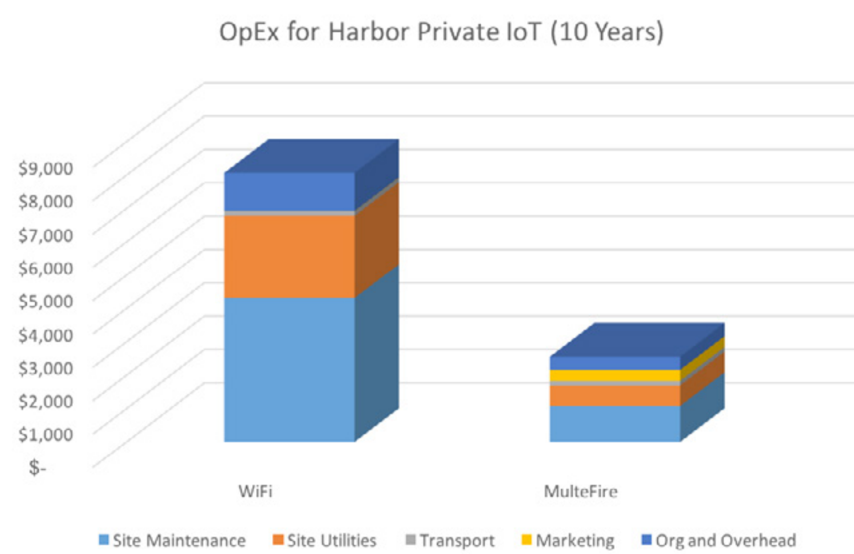


Figure 4
OpEx costs for the network calculates the expenses to support and maintain the network. The costs include site support and maintenance, backhaul support and maintenance, utilities for the network, data transport costs, marketing and organizational support costs. Because there are so many more Wi-Fi sites required, support, maintenance, and utility costs will be a good deal higher to support a Wi-Fi network with far more access points.

USE CASE #2 - ENTERPRISE IN-BUILDING NETWORK

Definition of the Venue and the Use Case

The example for the enterprise office building for this case study is 590 Madison Avenue, a 40 story building in midtown Manhattan. The building is a multi-tenant office building, with both lobby and parking areas that need to be covered as well.

590 Madison Avenue

Number of floors - 40

Total coverage area - 93,000 sq m

Total population - 6250

It is assumed that there would be both a cellular infrastructure and a Wi-Fi infrastructure in the building. Most of the enterprise tenants would have a Wi-Fi network in their offices. The model also assumes that 80% of data traffic is going over the Wi-Fi network. Still it is critical to have excellent cellular coverage everywhere in the building. In this use case example, the analysis will compare how a MulteFire in-building network would compare to either a DAS network deployment or a typical LTE small cell infrastructure capable of supporting only one operator at a time.

One of the key requirements is the need to support multi-operator small cell network solutions to deliver cellular coverage for all residence of a 'Middleprise' venues. The critical question is which solutions can provide the multi-operator capabilities needed for most venues at a cost point which can encourage a faster rate of deployment. While small cells can meet the cost-points required for in-building coverage, they have been challenged to provide coverage for more than one operator at a time.

In most cases, there are two options to provide connectivity if multiple operators are to be supported in an in-building network:

1) support all the frequencies required for each of the carriers

2) find one neutral spectrum which can support all the traffic for all the carriers

Typically, carriers prefer all their frequencies be supported by a neutral host DAS or small cell system. But this leads to a network supporting a dozen or more frequencies, which is expensive for the radios, infrastructure, and mobile carrier BTS equipment necessary for a complete DAS network.

If one frequency can be used in a small cell network, this leads to a much more efficient system and a lower cost basis. The development of neutral host networks is one of the most important trends in the broadband wireless industry today. The key advantage of deploying MulteFire in an in-building environment is the capability to deploy a single small cell infrastructure on an unlicensed spectrum band to support all residents of the building. As individual MNOs look to deploy their own solutions in small and mid-size venues, the cost for providing this additional coverage may not justify the benefit for the improved service. Yet, if a third-party can provide one shared infrastructure that can support all subscribers in a venue, the economics suddenly turn in favor of both the neutral host provider and the mobile operators.

Implementation of the Network

The MulteFire network is deployed to provide coverage through all office areas of the building. In addition, all public areas of the building, including the lobby and parking areas are covered. In the analysis, it is assumed that all subscribers would be able to connect to the MulteFire network. Over the next few years as MulteFire capability is added to handsets, the vast majority of smart phone users will be able to receive calls and data from the MulteFire network.

The network would be deployed with at least one small cell on each floor to provide coverage and capacity. In this case the model is predicting that a total of 52 small cells would be needed to support the requirements of the building. Since we are presuming that a third-party is deploying the network, the traffic will be sent to the EPC of each operator. In the basement of the building the neutral host would support a controller to manage the network and sort the traffic to each operator.

590 Madison Avenue needs:

- Total coverage area 93,000 sq m
- 8000 sq m public lobby coverage
- 5000 sq m of parking area coverage
- 80,000 sq m of office coverage
- 6250 people working in the building
- Assume that the office tenants have Wi-Fi in their offices, 80% of traffic is carried over Wi-Fi
- MulteFire deployed to support multi-operator cellular network
- Network would be paid for, and owned by a third-party neutral host

Users of the network

- Building operations
- All subscribers in the building
  - Assume that subscribers of all MNOs would be present in the building, in proportion to the market share of each operator

Business model

- The business model for the in-building network focuses on cost savings and operational efficiencies.
- Third-party neutral host owns and operates the network, in this analysis.
- Revenue presumes that an agreement is in place with operators.
- Neutral host pays fees to the building owner for access to the building.

Key Functions of the Network

- Supports cellular communications for all subscribers of the four major MNOs in the building.
  - Voice communication
  - Data communications
- Traffic in the network is parsed for each MNO and sent to their core network
- Transport of traffic out of the building is paid for by the neutral host

Value Proposition for the MulteFire Network

- Cost savings, both CapEx and OpEx
- Support multi-operator small cell support. Typical small cells require support of an in-building small cell network for each operator (x4, in this case)
- Managed network capability to facilitate support for multiple operators
- Network security to ensure key functions in the network

Cost Structure

- Cost of the network deployment and operations
- Network equipment cost
- Installation, construction, commissioning labor
- Cost for backhaul equipment and installation
- Implementation of internet connection
- Cost for on-going maintenance of network
- Cost for utilities
- Assume neutral host pays site rental to building owner

Revenue Streams

- In this example, it is assumed that the neutral host has a contract with each of the MNOs to provide connectivity for all of their subscribers in the building.

Monetization Models

While a number of business model could be possible to deploy the network, here we presume that a third-party neutral host will deploy the network. It is presumed that the neutral host will pay for the MulteFire network, and own and operate it. There are a number of monetization mechanisms that might be possible as well. In this case, because 590 Madison Avenue is a large building, the MNOs might pay for access to such a large user base. In other business models the building owner or the tenants might pay for access to the network.

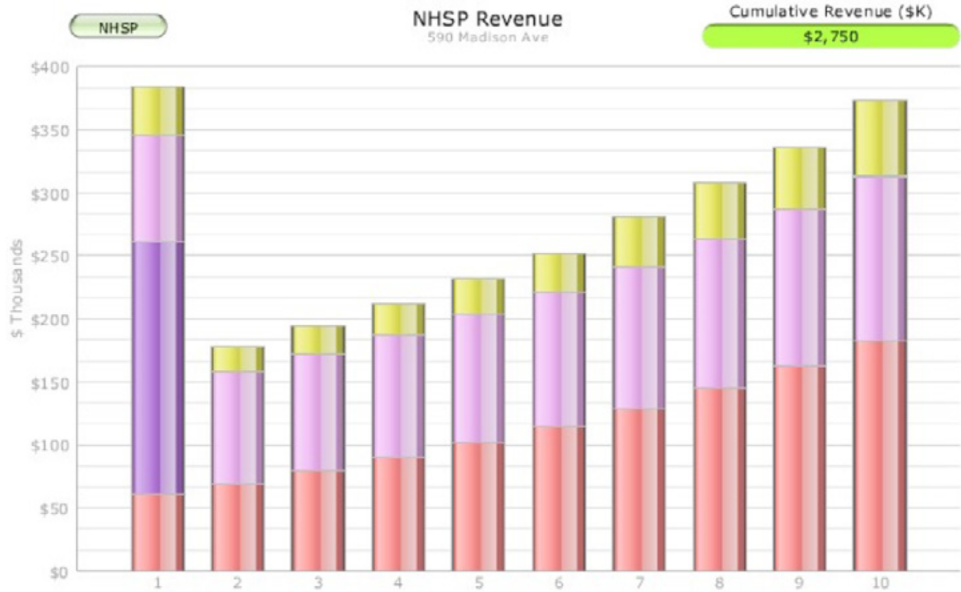
This analysis will propose support for all four major MNOs. For the analysis here, revenue for the neutral host could be derived from three sources.

- A CapEx contribution from each participating MNO as the network is deployed
- A monthly fee to deliver capacity to each of the MNOs' subscribers
- A usage fee on a per GByte basis

Actual business models could support some or all of these monetization schemes. The revenue derived from each MNO would likely be in some proportion to the number of subscribers from each operator that is supported in the venue. In other business models, revenue could be derived from enterprise tenants in the building, or from the venue owner itself.

Figure 5

For the sake of example, revenue for a third-party for the target venue, 590 Madison Avenue might look like this graph.



Economic Analysis

To fulfill the requirements of the deployment in 590 Madison Avenue, a network must be deployed to support all subscribers in the building. While DAS networks can be well suited to fulfill this key requirement, they are likely the most expensive option to deploy. A network of typical LTE small cells can be deployed as an in-building network. But four separate networks would need to be deployed and wired throughout the building, with the CapEx needed for four equipment sets, and installation cost for each of the MNOs. The capability of MulteFire technology to support all subscribers means that one infrastructure can be deployed throughout the building leading to the most cost-efficient means to provide full in-building coverage.

Figure 6

Based on the modeling results, the CapEx for MulteFire in-building network would be 75% less than a DAS network and 50% less than a network of typical LTE small cells.

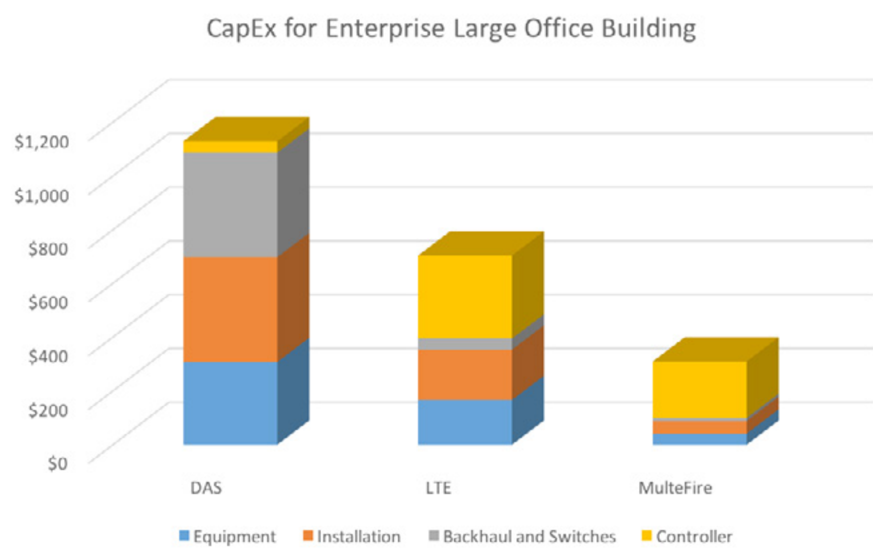
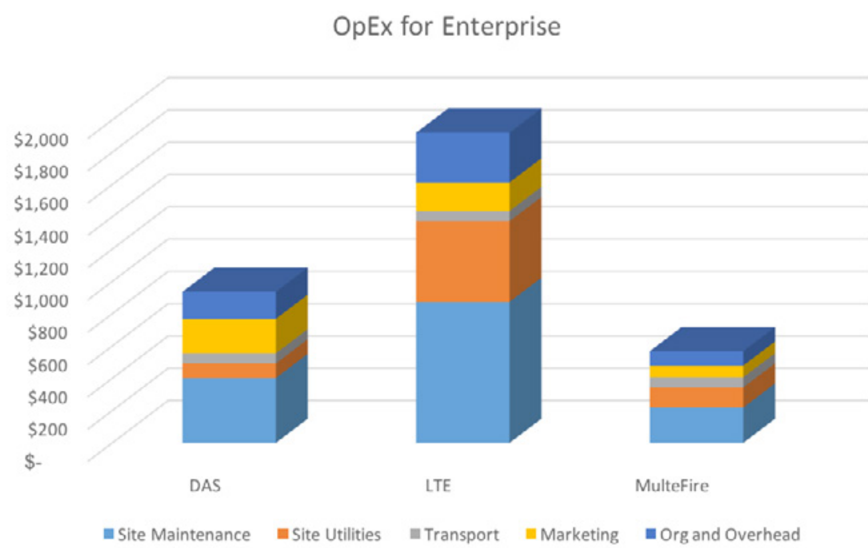


Figure 7

The efficiencies of the MulteFire in-building network results in lower costs for OpEx as well. Fewer components in the network leads to lower costs to support the network, the in-building backhaul, and whatever rental to the building owner that might be required.



ECONOMIC IMPACT OF MULTEFIRE SOLUTIONS

MulteFire is an attractive new technology option in many wireless applications because of the strategic value to implement new applications and new business models due to its superior performance in unlicensed bands. But in addition, as the analysis here has shown, there are significant economic benefits to using MulteFire as well.

When deployed as a closed system, MulteFire can deliver a significantly lower cost to deploy and operate a wireless infrastructure. The system capabilities which build on performance and economies of scale of LTE technology allow an efficient infrastructure deployment with fewer cells, and lower cost sensors and end user devices. The flexibility of a managed system also allows the network to be upgraded with new functions, devices, and applications to add increased operational efficiencies not necessarily measured here in the CapEx and OpEx analysis.

In an open network, MulteFire offers other efficiencies that lead to an economic advantage to support coverage in an enterprise building such as the high-rise office building used as the model for this analysis. By deploying one infrastructure throughout the building, MulteFire can provide savings of 50-75% over other alternatives for the initial CapEx investment. The total economic benefits of TCO over 10 years are even more dramatic, with over 60% savings over the alternatives for DAS networks and typical LTE cells.

CONCLUSION

MulteFire is developing as one of the key new technologies in the wireless industry. The capability to develop a high-performance LTE-like network in unlicensed spectrum creates new possibilities for wireless use cases and business model. As demonstrated here, the economic benefit of MulteFire can drive lower cost, new revenue streams, and better deployment models. In the Port of Singapore use case where the network is deployed as a closed network, MulteFire can deliver significantly lower costs for deployment and can deliver a managed network that can increase operational efficiency and security to further provide economic benefit. In the case of a large office building, such as 590 Madison Avenue, MulteFire can deliver key economic benefits deployed as a public open network. By supporting all subscribers with a single network in the building, MulteFire delivers lower cost and enables new revenue streams. These examples and the economic benefits they bring can be extended to many other deployments. By providing economic benefits for anyone who wants to deploy a wireless network, MulteFire can expand rapidly as a key technology for the ever-growing expansion of wireless networks around the world.

GLOSSARY

MNO - Mobile Network Operator. Major cellular service providers such as Verizon, Vodafone and AT&T.

LEED - Leadership in Energy and Environmental Design (LEED) is a rating system devised by the United States. Green Building Council (USGBC) - Evaluates the environmental performance of a building.

IoT - Internet of Things

DAS - Distributed Antenna Systems

This White Paper was authored by Randall Schwartz, Principal Consultant at Wireless 20/20.

Wireless 20/20 helps mobile operators and their vendors develop their Wireless Network strategies, service offerings, marketing plans, technology roadmaps and business cases. Wireless 20/20 also leverages its WiROI® Business Case Analysis Tools to assist clients in issuing RFPs and evaluating responses.

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