MBB: Where agility and growth go hand in hand

With the total number of base stations set to double over the next five years, Huawei's MBB 2020-focused GigaRadio and Agile Site solutions can adapt to multiple scenarios and environments, simplifying site acquisition and accelerating deployment.

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To better deliver people-to-things connectivity for mobile users, operators need to build many more new base stations for full coverage and to meet demand for mobile broadband (MBB), which continues to rise.

Globally, mobile base station density is uneven, with the per capita number of sites in densely populated regions such as Asia, Africa, and Latin America far below the global average. As explosive

global growth in MBB continues, projections show that the total number of sites worldwide will double within five years.

The Achilles heel

Optimizing mobile networks requires new sites, but space in cities is increasingly scarce – a conflict that's intensifying. Factors such as public concern over signal radiation and complex site approval procedures add to the difficulties.

In the past, little consideration was given to how traditional base stations fit in with the surrounding environment. Now people care, and operators have to defend existing sites. Studies show a 5 to 7 percent loss in the number of sites per year worldwide, which is a net loss for density.

But, operators are ramping up construction to the extent that investment is disproportionate to income. With power consumption, rental, O&M, and service costs for base stations on the rise, ROI and energy savings are operators' priorities.

Getting agile

With MBB 2020 approaching, Huawei has released its GigaRadio and Agile Site solutions. Delivered with network consulting and analysis services, the solutions provide innovative E2E site solutions and simplified site acquisition. They can adapt to multiple scenarios and environments to improve overall site investment and ROI, and help operators resolve the pain points of increasing site density and building mobile communications networks ready for MBB 2020.

Joint innovation by Huawei and its partners has found that an effective approach to increasing base station density includes the following features:

1. Use existing site resources by providing wireless network consultation and site construction planning services. The agile site construction concept involves fully using existing sites and pole resources to improve network construction topology (super-macro multi-sector/centralized sites + remote simple sites), simplifying sites and transmission, and increasing coverage and capacity.

2. Develop new solutions to acquire site resources. For urban public infrastructure such as street lights and bus stops, site sharing across industries plus faster and bulk site acquisition can be realized through industrial-aesthetic site designs, innovative street light solutions, and Smart

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Site Access Node (SAN) solutions.

3. Adopt agile site construction to provide outdoor micro-sites and indoor Small Cell solutions for valuable regions and high-traffic indoor areas to help operators quickly capture high-value areas and increase ROI.

Zero footprint

Centralized base stations simplify site structure, while Huawei's Blade Site solution resolves the issue of limited space for sites with base stations constructed from stackable blades that can be flexibly installed outdoors.

Lite Site/Hub centralized base station: The solution adopts a "1 carry n" mode to streamline simple sites. It lowers acquisition time and electricity supply and transmission costs; simplifies site design, planning, and deployment; streamlines end sites, and increases site deployment agility.

There are two types of centralized sites: The first type is transmission with centralized backup power. This type fully uses existing poles and municipal pipes and wiring, and BBU/Power/Battery centralization and Easy Macro/remote RRU are used to streamline end sites. It suits scenarios where there are difficulties with mains supply and transmission, and where municipal pipelines or overhead wiring are available. The second type is transmission centralized sites. These fully use existing poles, AirHub RRN and RLN one-to-many transmission solutions, and Easy Macro/RRU end site local backup power. This site suits scenarios that have difficulties with wired backhaul and power supply.

Blade Site: GigaRadio provides a complete Blade Site solution, and includes a full series of outdoor BBU, BBU, battery, microwave transmission, and AirHub blades. This enables flexible combinations and modules to be assembled seamlessly on outdoor poles,

making base station installation as easy as fitting together Legos. Site construction simply requires a pole to build a zero-footprint site. Other than standard macro site scenarios, Blade Site provides the simplest site solution for linear coverage scenarios (highways/ high-speed rail), and rural wide-coverage scenarios.

Focusing on form factor

Rapid advances in integrated circuits have reduced the size of equipment, enabling industrial-aesthetic designs. The agile site solution uses unobtrusive site designs to better incorporate equipment into urban environments. Jointly designing and planning base stations and municipal infrastructure creates a new way to acquire sites.

Easy Macro lightweight street-side simple sites: Lightweight sites lie between the level of a macro site and a Small Cell, which account for an estimated 20 percent of all sites. They can be deployed quickly to boost network coverage and capacity. Easy Macro incorporates ultra-wideband RF antennas and can easily be integrated with an attractive design for integration with the surrounding environment, significantly reducing the difficulty of site acquisition.

Street lights and green sites: Open cooperation with the industry chain, such as local municipal and electricity departments or operators, allows the bulk acquisition of sites and utilization or transformation of existing infrastructure. Integrated street light/base station design enables invisible components and cables, as well as completely natural outdoor cooling.

In the UAE, Egypt, South Africa, and China, operators and government departments are working together to use street lights for fast deployment and to create the latest base station platform using open IoT tech to unify planning with smart city systems. Thus, they can maximize site value.

Boosting coverage for quicker returns

High-value areas have long been a key battleground for operators. Agile sites can provide comprehensive indoor and outdoor coverage solutions to help operators capture high-traffic areas and ensure rapid returns on site investment.

Outdoor micro sites: Lighter micro-level base stations are needed to meet requirements for deep coverage in high-traffic urban areas. From single-mode low-power (<1W) in the past to today's various multimode, multiband power (1-10W) sites, the solution can adapt to a wide range of scenarios. These include outdoor utility poles and lamp posts, railway stations, billboards, and telephone booths in central business districts, residential areas, and other locations where site selection or coverage is difficult using macro sites. Projections show that micro sites will account for up to 20 percent of sites by 2020. Outdoor micro sites have a modular design that supports automatic site deployment and utilizes distributed MIMO, 256QAM, and LAA for 4.5G gigabit peak rates.

Small Cell for high-traffic areas: There are a high number of high-traffic indoor areas where MBB traffic has been restricted for a considerable time. The Small Cell indoor digitalized solution comes at the perfect time to meet this need. The solution's indoor RRU/ LampSite and Pico solutions can be adapted to a wide range of scenarios, including airports, stadiums, commercial office buildings, subways, campuses, and residential areas. The solution enables the flexible and smooth multiband and multimode expansion of single cell capacity. It can be flexibly and conveniently installed, including terminal RF coverage visualization and direct network management.

Connecting the 4 billion unconnected with MBB connections, and a 20-fold growth in network capacity are central to the MBB 2020 vision.

Green thumbs

The mobile communications industry uses huge amounts of energy, causing heavy carbon dioxide emissions. Moreover, the vast number of base stations means that operators shoulder gigantic electricity costs, placing pressure on them to cut energy consumption.

Continual improvement of energy efficiency of base stations: High-efficiency power amplification (PA), new materials/chip sets, cooling chimneys, and cooling teeth have increased PA efficiency from 19 percent to 55 percent. With distributed base stations, the RF is closer to the antenna, reducing feeder loss by 3 dB. The outdoor modularization of the Blade Site solution enables natural cooling, removing the need for air conditioners and equipment rooms. Compared to the 3,000W of power required by traditional 2G base stations, SingleRAN multimode base stations reduce power consumption to below 1,600W, but give dozens of times higher capacity and connectivity capability.

Maximized site energy efficiency: Existing network equipment rooms have a large number of old power (and backup power) supply and air conditioning components that operate at around 80 percent efficiency. Replacing them with high-efficiency ones that run at 96 to 98 percent efficiency can reduce energy waste and OPEX. For example, during a modular transformation project, British Telecom replaced 10,000 equipment rooms and 30,000 sets of old modules, saving £22 million in OPEX annually.

Mixed new energy: Adding multi-energy scheduling to power-hungry sites can increase site-level efficiency to 94 percent. In areas where mains supply is poor or unstable, mixed power supply can reduce power consumption by 50 to 70 percent. In areas where mains supply is good or energy prices are high, adopting site power overlay can also reduce OPEX. For example, in a project in Pakistan, low-power base stations and high-efficiency power, cooling, and mixed power supplies helped the client reduce OPEX by 80 percent and TCO by 56 percent in five years.

New growth

Constructing base stations that are closer to people and objects and have greater capabilities, connecting the 4 billion unconnected with MBB connections, and a 20-fold growth in network capacity are central to the MBB 2020 vision. As a valuable asset of operators, base stations are critical to increasing network capacity and a cornerstone of achieving this vision.

Huawei's series of innovative agile site construction solutions, such as Blade Site, Easy Macro, Micro Site, and LampSite – a joint innovation with operators – can simplify the site construction process, beautify site locations, and reduce network TCO. These solutions will help operators quickly increase site density and boost MBB coverage and capacity, creating new room for MBB growth and paving the way for MBB 2020.