Beta Labs

NETWORK ECONOMICS REPORT

NETWORK INNOVATION DRIVING COST INTENSITY SAVINGS

MARCH 2019

GSMA

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The GSMA represents the interests of mobile operators worldwide, uniting more than 750 operators with over 350 companies in the broader mobile ecosystem, including handset and device makers, software companies, equipment providers and internet companies, as well as organisations in adjacent industry sectors. The GSMA also produces the industry-leading MWC events held annually in Barcelona, Los Angeles and Shanghai, as well as the Mobile 360 Series of regional conferences.

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DISCOVER INNOVATION

Faisal Zia, Beta Labs Lead, GSMA

Operators are facing a challenge, with revenues stagnating in many markets. The 5G revenue opportunity is beginning to crystallize but is still not clear, and cost reduction has become a key priority.

Over the past 12 months, the GSMA Future Networks Programme has launched 'Beta Labs', which, through a series of case studies, has profiled a number of cost intensity[1] innovation and strategy options. These case studies have identified opportunities for operators highlighting a minimum cost intensity reduction average of 0.75% per study, which for the validating operator equates to a total saving of approximately $450m[2] (6.7%).

The reality is that there is no panacea or single solution for an operator, however, we have seen that a combination of several innovations could cumulatively result in the overall improvement of network economics. Working closely with operators and a broad ecosystem of partners, Beta Labs is building a library of tried and tested innovative solutions to give operators options to improve their capital intensity.

If 5G is expected to deliver up to a thousand times as much data as today's networks, the increased traffic, processing and densification of networks may consume up to two or three times as much energy. Beta Labs was established with this in mind, as supportive action needs to be taken to identify options to keep costs down and unlock additional value from the network in the areas of energy efficiency, infrastructure sharing and backhaul.

Renewable energy is at the forefront of these considerations, with solar and wind farms achieving grid parity in many markets and costs continuing to fall, operators are increasingly turning to these solutions not only for economic reasons but also the sustainability agenda – responding to climate change has become a key area of interest especially through the UN Sustainable Development Goals.

Densification means that the sheer number of sites or having to maintain 2G, 3G, 4G and 5G networks is likely to result in an energy increase, so operators should consider alternative models for commercial infrastructure-sharing, e.g. municipality-based neutral host models to share the cost. In addition, with IoT and hyper-connectivity, a new breed of service providers will also require access to infrastructure.

At the core is data, looking at alternatives to the traditional backhaul approach to extend fibre deep into the network, such as using fixed wireless access and the passive optical network, which can create mesh networks reducing the need for sites and central offices but also bringing content closer to the consumer with multi-access edge computing (MEC).

In the year ahead, AI & Automation will be added to the roster of topics, as operators begin to digitally transform their networks.

I'm often asked what will the networks of the future look like – the answer is come to Beta Labs and find out.

[1] Cost Intensity defined as the CapEx +OpEx over revenue

[2] Calculated on Operator reported financials at end of FY 17/18, based on hypothetical tier 1 operator

NOTE: Companies profiled, case studies and outputs from Beta Labs, including the network economic model are provided for information purposes only and do not constitute an endorsement or recommendation.

BETA LABS CASE STUDIES SUMMARY

Full details available at www.gsma.com/betalabs

www.gsma.com/futurenetworks/wiki/ccs-case-study

Enabling Neutral Host to accelerate infrastructure sharing: CCS

This case study focuses on the cost-effective deployment of an alternative transmission solution, provided by CCS, which enables more than two operators to use the same network infrastructure (i.e. enabling the neutral host model). The example profiles the City of London using MetNet small cells on existing street furniture in partnership with Telefonica.

Key highlights:

- Enables the neutral host model: infrastructure can be leased to 3rd parties to create revenue and indirectly share costs.
- Is easy to deploy and operate: City of London deployment was fully operational in 13 weeks.
- Adapts to changing environment: Self-organising and self-healing capabilities make the network adaptable to the changing environment reducing impact on operations and maintenance.
- Applicable to Fixed Wireless Access applications opening new use cases.

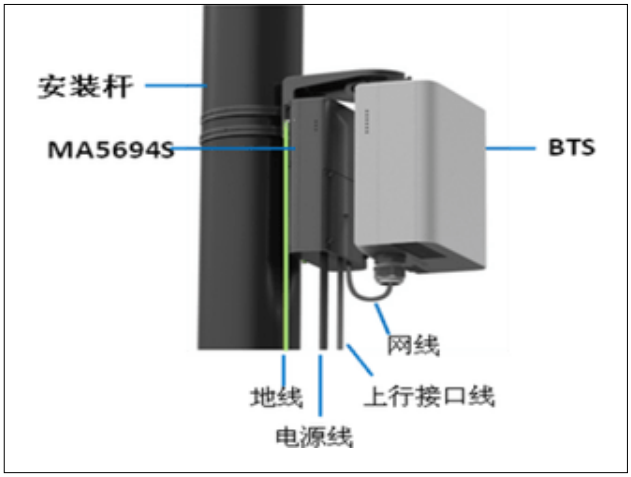
www.gsma.com/futurenetworks/wiki/willowmore-case-study

Smart Padlocks: Willowmore

The Willowmore Smart Padlock provides enterprise-grade multi-role access control management platform and smart padlock solution, to reduce the inefficient costs and time used to manage physical keys.

Key highlights:

- Reduces need for field staff to collect keys from field centres before a site visit.
- No physical keys, virtual keys and permissions are stored in a mobile application which can be granted, approved or rejected in real-time.
- Allows Network Operating Centres (NOCs) and managers to track all access data and create multiple roles for organisations, managers and 3rd party contractors.
- Integrated task and access management system allowing analysis of task frequency per site and benchmarking productivity of site engineers.



www.gsma.com/futurenetworks/wiki/sk-telecom-case-study

www.gsma.com/futurenetworks/wiki/case-study-china-telecom

Innovative Fronthaul: SKT

SKT focuses on the challenges and optimisation of the transport demand by employing an innovative fronthaul transport network solution called 5G-PON (Passive Optical Network). 5G-PON reduces the size of the remote unit at the very last mile and supports the flexible installation/configuration of the fronthaul networks.

Key highlights:

- Flexible and scalable installation: Can be mounted above or below ground level.
- Easy and flexible configuration: Not bound by the location of its deployment.
- Plug & play: Auto tuning and wavelength locking features enable plug and play of new network nodes.
- Pay as you grow: The use of passive nodes and tuneable SFPs enable PAYG networks.
- Intelligent operation management & analysis: Auxiliary management and control channel enables the transfer of information for intelligent operation & maintenance.
- Interoperability: Fully (Multi-Source Agreement) compliant SFP enables interoperability with other deployed systems in the network.

FMC Based backhaul: China Telecom

Small cell backhaul based on Passive Optical Network (PON) system, that can reduce at least 80% of the trunk fibre and 50% of associated fibre improving coverage and capacity are the focus of China Telecoms case study.

Key highlights:

- Small cell backhaul based on Passive Optical Network (PON) system is proposed, which can reduce at least 80% of the trunk fibre and 50% of associated fibre and facility room and air-conditioner are no longer required.
- China Telecom has conducted laboratory and field test in Hubei City and Shanghai with Huawei and ZTE. The test results proved the feasibility with equipment and performance KPI's satisfied.
- Backhaul based PON could be one of the preferred choices for small cell backhaul transport.

www.gsma.com/futurenetworks/wiki/turkcell-case-study

www.gsma.com/futurenetworks/wiki/vodafone-case-study

Network Transformation through Energy Efficiency: Turkcell

Turkcell's innovation highlights both the challenges and optimisation delivered in their network transformation project, where they used intelligent connectivity to significantly reduce the energy consumption across the network.

Key highlights:

- After evaluating actual loads and utilisation the power system capacity was re-dimensioned to from 12kW to 9kW by reducing modules by 25% resulting in ~20% CapEx saving.
- By identifying excess power, Turkcell reallocated 7% of existing rectifiers and re-utilised them at new sites identifying a CapEx saving.
- Battery backup requirements based on actual availability targets and grid cut-off statistics, after battery re-dimensioning on all sites, the number of batteries reduced by 20%.
- By modernising radio equipment, Turkcell observed an average reduction of 20% in energy consumption keeping the same radio capacity.

Battery Theft: Vodafone

This case study focuses on battery pilferage from base stations, which is a key issue that affects mobile operators irrespective of their geographic location. The solution is a GPS tracker concealed within the battery housing. Aside from CapEx investment required for re-securing the site and battery replacements, increased OpEx costs as thefts interrupt the battery replenishment cycle creating greater maintenance requirements.

Key highlights:

- First in class innovation with no similar project currently available on the market.
- Concealed GPS devices within the battery casing that is indistinguishable from standard.
- When unauthorised movements detected, the GPS is activated and monitored remotely in real time.
- Early successes recorded, while some remain under active investigation, Vodafone's solution led to the recovery a significant amount of batteries otherwise written off.

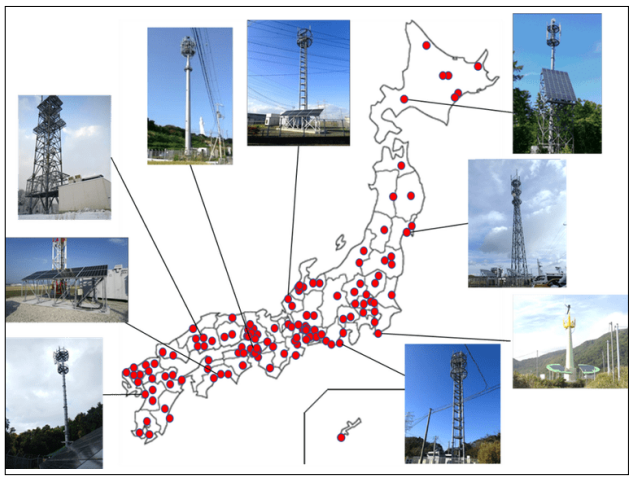
www.gsma.com/futurenetworks/wiki/ruralstar-huawei-safaricom-case-study

Huawei RuralStar Solution: MTN Ghana

A cost-effective deployment of rural coverage, being a base station which can be constructed on a simple wooden pole instead of a 30m dedicated tower, specifically designed to provide 2G and 3G voice, data and other services (e.g. mobile money) for rural communities.

Key highlights:

- Easy installation and designed to provide connectivity to immediate surroundings of the village so antenna mast is smaller and cheaper enabling wider coverage.
- Connectivity to the main network via 4G base station relay transmission without using cabling or physical connectivity: this is cheaper to install and more power-efficient
- Powered by solar energy with battery back-up for night-time – which saves on the capex and OpEx costs of a diesel-powered generator.



www.gsma.com/futurenetworks/wiki/ntt-docomo-case-study

Green Base Station: NTT DOCOMO

NTT DOCOMO has developed Green Base Stations, an environment-friendly and sustainable energy supply scheme for radio base stations.

Key highlights:

- Green Base Stations equipped with photovoltaic (PV) panels, cycle-type Li-ion storage batteries with smart power control.
- During power outage, sites can operate longer using PV power generation rather than back- up generator or batteries.
- Green Base Stations reduce the impact on the global environment and provide disaster-resilient communication infrastructure.
- NTT DOCOMO has solution in 133 base stations aiming to increase the penetration of the solution and the PV generation capacity to 2,000 kW by 2020.

www.gsma.com/futurenetworks/wiki/case-study-telefonica

Green Energy Consumption: Telefonica Mexico

Through a PPA (Power Purchase Agreement), 40% of Telefónica México energy will come from Solar Energy, providing power to its stores and antenna bases. Telefónica's commitment is for all of the company's energy consumption to be 100% green by 2030.

Key highlights:

- Increases in network consumption and therefore energy cost, derived from the creation and increase of base stations and commercial stores.
- Increasing cost of energy and options to self-generate energy not previously viable due to security and high investment cost.
- Telefónica is committed to making all its energy green by 2030.

SUSTAINABLE DEVELOPMENT GOALS

sustainabledevelopment.un.org

GSMA Beta Labs supporting the UN Sustainable Development Goals

The UN Sustainable Development Goals (SDGs) are a collection of 17 global goals set by the United Nations General Assembly in 2015 for the year 2030. The work the GSMA Beta Labs is doing through the case studies in this document directly feed into a number of these goals, namely Affordable & Clean Energy, Responsible Consumption & Production, Climate Action and Industry, Innovation & Infrastructure. For more information about these goals, or to read into some of the specific areas mentioned previously, visit the link above.

HOW TO GET INVOLVED?

Network economics will play a part in determining how quickly 5G networks are rolled out around the world and the industry has a significant role to play in supporting their deployment. Only by following a coordinated industry-wide approach can we deliver the networks of the future.

Throughout the year Beta Labs has placed the spotlight on three core areas; Energy, Backhaul Relief and Infrastructure Sharing, all of which are not only integral to the deployment of network services but also drive much of the cost in networks. These areas also support a number of the UN Sustainable Development Goals.

Beta Labs has developed a Network Economic Model (NEM) which first baselines existing network topology, and then iteratively overlays and profiles new, disruptive technologies or network management strategies that can deliver efficiencies or new revenues. The modelling is then ratified via operator review to evaluate their potential impact, and the goal is to showcase the "best of the best", and identify collaborative actions to support operators.

Ultimately, the economics drives the speed of the deployment of MNO (Mobile Network Operator) network and services, the case studies we cover later are a reflection of the emerging picture. As operators move to more software defined virtualised networks, in FY2019/20, the Beta Labs will also consider disruption and innovation in network automation and AI.

If you would like to join the Beta Labs Innovator roster or to find out more information please visit www.gsma.com/betalabs or contact futurenetworks@gsma.com.

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