plum insight

Enabling improved network and spectrum efficiencies via Multi-Operator Core Network (MOCN) technology

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Plum has recently undertaken a detailed review of Multi-Operator Core Network (MOCN) technology, with assessment on commercial and economic efficiencies. MOCN brings incremental benefits over Multi-Operator Radio Access Network (MORAN) technology in that, additionally, MOCN enables spectrum sharing. With ongoing traffic demands towards 4.5/5G, we believe that MOCN technology and spectrum sharing are important enablers that must be considered by regulators. We provide here a brief independent overview of MOCN technology, with identification on key benefits and recommendations.

What is MOCN technology?

MOCN has some similarities with Multi-Operator Radio Access Network (MORAN) technology; both offer sharing of network elements across multiple commercial operators which can enable material cost efficiencies (across both investment and operational cost domains). Materiality in any such cost efficiencies will of course vary by specific deployment cases. However, and importantly, MOCN also enables sharing of the radio spectrum resource across commercial operators. MOCN offers comparable levels of cost efficiency as with MORAN systems as a result of network element sharing, and a further incremental capability and efficiency as spectrum sharing. The materiality of benefits with this incremental capability may be substantial, dependent on deployment scenarios.

MOCN differs from Mobile Virtual Network Operator Network (MVNO) models in that both asset and spectrum sharing is enabled; MVNO deployments are effectively based on asset leasing and can present higher barriers to market entry for new entrants.

A summary of MVNO, MORAN, MOCN architectures is shown in Figure 1.

MOCN enables ‘programmable’ configuration of the radio communications resource across multiple commercial operators, as supported by any one allocation of physical radio spectrum. With currently available equipment, such programmability is typically enabled via the network management system (NMS) which may be operated by one commercial operator in any commercial model, or jointly via a ‘broker’ based NMS network architecture. With current equipment releases, configuration of the radio resource is typically ‘programmable’ across the full network (e.g. to national or regional level), and with a level of flexibility consistent with managed usage at the NMS level.

MOCN technology is established and commercially and economically proven; initial commercial deployments date back to 2001 (in Sweden).

Current commercial releases of MOCN equipment typically support spectrum sharing within each radio carrier and within one radio access technology type (e.g. multiple carriers with sharing on a 3G system, or multiple carriers with sharing in a 4G system). With developments towards 4.5G and 5G technologies, we expect that flexibility in spectrum sharing will increase; it may be possible in future to attain pooling of the radio resource across multiple radio access technologies.

Key benefits available with MOCN

MOCN can bring technical, commercial and economic benefits as a result of greater flexibilities in sharing that generally will not be afforded in other system deployments.

‘Spectrum slicing’ (i.e. flexible allocation of capacity across commercial operators), as may be enabled by MOCN technology, and as is being actively considered in the development of 4.5G and 5G technologies, offers potential for substantially improved efficiency in the exploitation of the radio spectrum. The use of radio frequencies, as typical in today’s markets, can give rise to inefficiencies (due to block edge mask losses in non-contiguous bands, signalling overheads, and queuing inefficiency with scheduling in narrower bands).

Cases that are likely to bring significant overall economic benefit are those where some imbalance exists in markets (e.g. in allocation of frequency bands, levels of capacity attainable, levels of market demand). Thus, MOCN can be seen as tool to enable competitive balance in markets in some cases, and as such is not only a mechanism for greater efficiency for operators, but can also be a new important tool for regulators to enhance market efficiency, and bring competition and consumer benefits.

Case example - Israel

As a result of regional issues, Israel suffers from limited co-ordination on spectrum allocations with neighbouring countries. With a vibrant home market in mobile communications, a key issue facing all operators, and new entrants in particular, was limited access to spectrum. With growth in traffic in Europe towards 4.5/5G systems, a similar problem exists. Following detailed reviews, supported by independent experts, Israel's Ministry of Communications (MOC) noted that: 'As a rule, the Ministry sees advantages in MOCN-type active sharing, compared to MORAN-type active sharing, in light of the current need to optimise the frequency spectrum'.

Key recommendations

The use of MOCN technology should not be excluded via 'blanket' policies as is the case in some national jurisdictions; rather, MOCN should be considered as a viable, feasible, and proven technology that can offer significant benefits. Operators should be allowed to adopt this approach to enhance efficiencies. Regulators should also consider MOCN as a regulatory tool, just as they have in the past viewed resale, MVNO, and other approaches as remedies or safeguards on effective market operation.

Precedent exists in various cases where readily implementable regulatory remedies can be implemented to allay any anti-competitive concerns.

Consideration must also be given to the question as to how much differentiation is offered in radio networks, and the need to balance competition and innovation across both infrastructure *and* service levels in the industry.

With significant ongoing growth in traffic demand in most markets, placing increasing demand on physical radio spectrum resources, technologies such as MOCN, and those under development (e.g. LWA[1], LSA[2], LAA[3], DSA[4]) are being actively examined by commercial operators. Regulators must do the same to ensure economically efficient use of radio spectrum and to maximise benefits for consumers.

In summary, realisation of efficiencies and benefits possible with MOCN and spectrum sharing should not be inhibited or discouraged. In some cases this will require effective and proactive collaboration between commercial operators and governmental agencies.

Full report

A full report on the issues raised in this short paper is available from Plum. Please contact the author as below for a copy.

[1] LWA: LTE – WiFi Aggregation technology.
[2] LSA: Licensed Shared Access technology.
[3] LAA: Licensed Assisted Access technology.
[4] DSA: Dynamic Spectrum Access technology.

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Contact information

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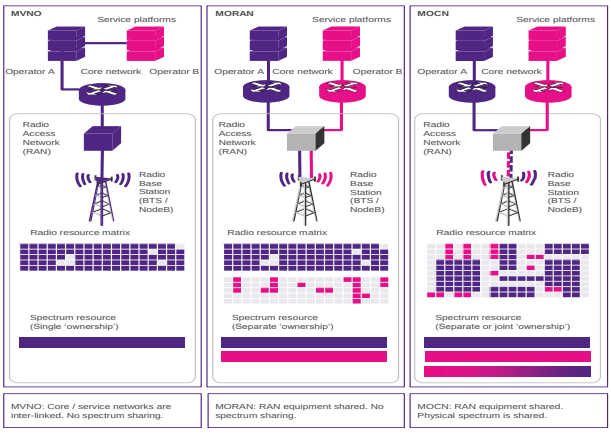
Figure 1: Overview of system architectures (MVNO, MORAN, MOCN)



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