

Open access LTE

Reducing LTE deployment costs for rural broadband coverage

Nokia Bell Labs consulting brief

How can policy makers close the digital divide by accelerating deployment of LTE services at affordable prices, particularly in rural markets?

A nationwide LTE rollout typically requires large investments, takes a long time to deploy, and provides delayed profitability for the operators, especially when covering large and sparse rural markets. In this situation a wholesale LTE model-open access LTE-can reduce investment risks and improve the profitability of LTE services for incumbent 2G/3G mobile network operators (MNOs), and can even spur competition.

In the open access LTE model a single entity, the mobile virtual network enabler (MVNE), owns the spectrum and deploys a single nationwide LTE network overlaying the existing 2G/3G networks from incumbent MNOs. Rather than build their own LTE infrastructure, the incumbent MNOs can choose to become mobile virtual network operators (MVNOs) by renting LTE capacity from the MVNE entity. Bell Labs advisory studies conducted for policy makers in several developing nations showed this LTE adoption model could deliver up to 50 percent net present value (NPV) increase over a traditional MNO approach, as well as provide a strong business case for the LTE wholesaler.

Case study

A Nokia Bell Labs advisory study was conducted for the government of an emerging nation that was debating the benefits of a spectrum auction over an open access LTE model in a mobile market dominated by an incumbent 2G/3G MNO. The analysis compared three plausible scenarios for LTE deployment:

1. Traditional MNO-1: Incumbent refarming 850 MHz and AWS spectrum
2. Traditional MNO-2: Incumbent buying 700 MHz spectrum while refarming AWS spectrum for LTE densification in urban areas
3. Open access LTE: Incumbent renting 700 MHz spectrum capacity from a wholesaler (MVNE) while refarming AWS spectrum for LTE densification in urban areas (MVNO + AWS)

The following table summarizes the business case results for each of the above scenarios:

Scenario	Player	Sites (thousands)	Peak funding (US\$ billions)	Payback (years)	NPV (US\$ billions)
Traditional MNO-1	Incumbent as MNO (850 MHz + AWS)	35	3.3	8.9	0.9
Traditional MNO-2	Incumbent as MNO (700 MHz + AWS)	29	3.3	8.6	1.2
Open access LTE	Incumbent as MVNO	14	0.9	6.9	1.7
	New wholesaler MVNE	20	1.3	7.5	1.1

Benefits from open access LTE

The critical decision for this emerging nation was whether to forego the near-term revenues from a 700 MHz spectrum auction for the potential future benefits of better value, more widely available nationwide broadband service over a shorter time period, and higher GDP and related tax revenues. The study showed that the open access LTE adoption model would lead to higher LTE penetration, lower subscription pricing, and improve 4G coverage over that of the traditional MNO adoption model. The benefits also outweighed the loss of auction revenues. Key benefits include:

- More efficient use of the scarce spectrum resource:

The open access LTE model leads to significant reduction in the number of radio sites - both in urban areas with heavy traffic and in rural areas where coverage considerations would have led to much larger deployment of underloaded sites in the conventional MNO model.

- Affordable, quick and widely available LTE services:

Reduced number of required sites significantly lowers the threshold for economic viability by reducing the peak investment needed by the incumbent 2G/3G MNO (more than two-thirds reduction in this case). It also spurs competition in the LTE services market by lowering the market entry barriers for other MNOs, thus making wireless broadband access more widely available, especially in rural areas. This leads to faster national coverage, lower deployment costs and subsequently wider availability and higher affordability of the LTE services.

- Better profitability for incumbent operators than the traditional auction model:

As the summary table shows, the business case for the incumbent 2G/3G MNO is significantly improved—payback period nearly two years shorter and NPV (over a 10-year period) nearly doubled relative to the conventional MNO model. Compared to buying spectrum using the traditional auction model, the price paid by the MVNOs is reduced because the network is optimized to meet the actual traffic needs with the minimum number of sites.

- Boost to the economy:

Higher LTE penetration allows lower subscription fees and increased tax revenues. The tax surplus can largely exceed the revenues generated by the spectrum auctions. There are other spillover impacts on employment, health, and transport, as well as opportunities for better service delivery by governments.

- Improve social welfare:

Promotes quick and affordable access to broadband services and reduces the digital divide, particularly in emerging countries where rural areas are generally underserved by both mobile and fixed broadband access operators.

These considerations underline the importance for governments and regulators in developing nations of carefully evaluating their spectrum allocation options before making strategic decisions that will shape the future of their mobile telecommunications landscape for the next decade. As each situation is unique, proper economic modeling is required to support the decision process.

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