

RESEARCH STRATEGY REPORT

2G AND 3G MIGRATION: CHALLENGES AND INVESTMENT CASES FOR SOLUTIONS

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About this report

This report analyses how operators can minimise the cost and revenue impact of 2G and 3G decommissioning. It considers the business cases for different strategies to smooth the 2G/3G migration process.

The report also provides recommendations for mobile network operators (MNOs) in emerging and developed markets.

It is based on several sources:

- Analysys Mason internal research, such as our Global Core Data
- interviews with players in the mobile market, including emerging and developed market MNOs and 2G/3G equipment vendors.

KEY QUESTIONS ANSWERED IN THIS REPORT

- What costs will operators incur when they decommission 2G and 3G networks?
- What revenue losses will operators incur from a final decommissioning of 2G and 3G networks?
- What is the business case for operators investing in dynamic spectrum allocation, 2G IoT in guard bands, shared 2G/3G networks or isolating 2G/3G networks from 4G as means of easing the process of 2G and 3G decommissioning?

GEOGRAPHICAL COVERAGE

- Worldwide, covering both developed and emerging markets.

CASE STUDIES

- Impact of revenue losses from decommissioning on AT&T and Telstra.

WHO SHOULD READ THIS REPORT

- Executives in developed market MNOs' strategy offices who are considering the financial consequences of their 2G and 3G decommissioning strategies.
- Executives in emerging market MNOs' strategy offices who are considering how to address demand for mobile data and grow their revenue by effectively repurposing spectrum from legacy technologies.
- Executives in emerging and developed market MNOs' strategy offices who are assessing the business case for investing in dynamic spectrum allocation, using 2G IoT in guard bands, developing shared 2G/3G networks or isolating 2G/3G networks from 4G as precursors to full decommissioning.

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Executive summary

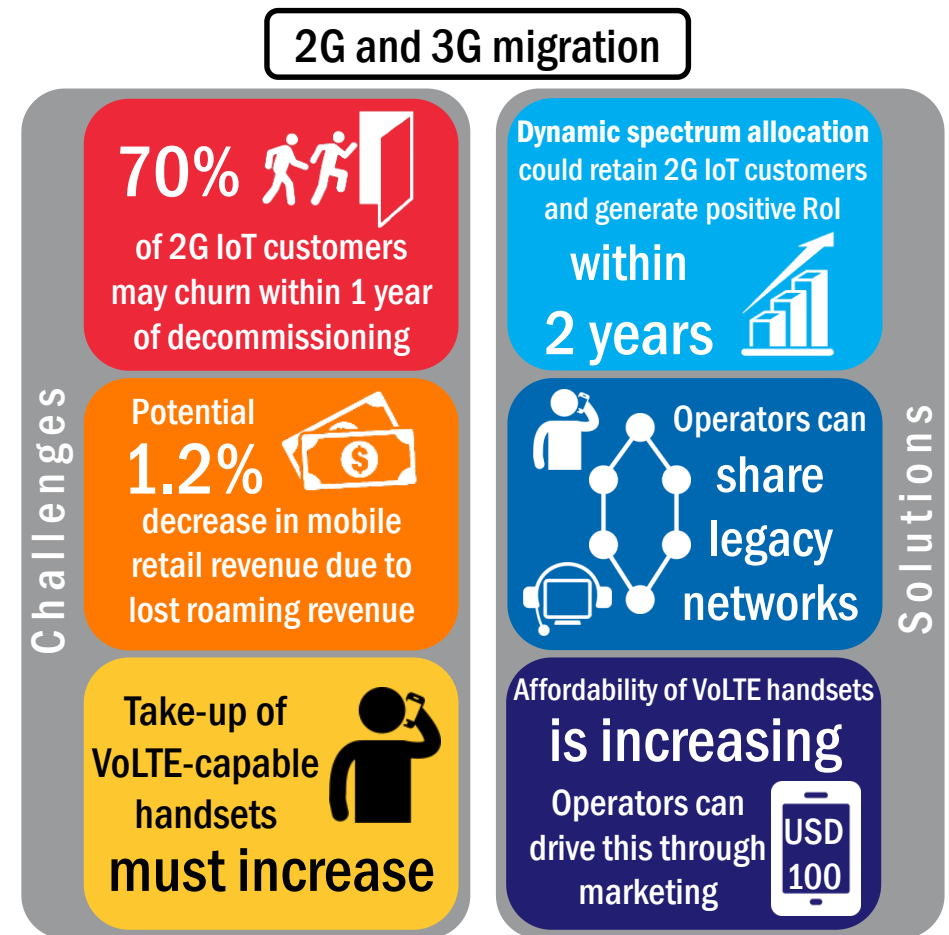
MNOs should minimise the burden of continuing to support 2G and 3G (in the face of increasing traffic and subscriber expectations) through approaches such as dynamic spectrum allocation between these legacy technologies and 4G.

Traffic growth is driving MNOs to devote as much spectrum as possible to 4G, which is in turn driving them to decommission 2G and 3G networks. However, the process of decommissioning these networks brings its own challenges in terms of both cost and impact on revenue.

This report examines the process of decommissioning 2G and 3G networks in developed markets and quantifies both the cost and the revenue impact. It assesses the revenue opportunities that operators may miss by supporting legacy technologies in emerging markets. The final section of the report considers the business cases for MNOs to invest in four approaches that mitigate the challenges of 2G/3G switch off: dynamic spectrum allocation, 2G IoT in guard bands, shared 2G/3G networks and isolating 2G/3G networks from 4G.

The report recommends that MNOs consider managing the process of decommissioning 2G and 3G networks through dynamic spectrum allocation, which allows different technologies to share spectrum. The cost of decommissioning will make it logical for most MNOs with large numbers of 2G M2M connections to maintain 2G networks for the next few years.

Figure 1: Challenges to 2G and 3G migration and possible solutions



Source: Analysys Mason

Traffic growth is driving operators to repurpose 2G and 3G spectrum, but network decommissioning brings its own challenges

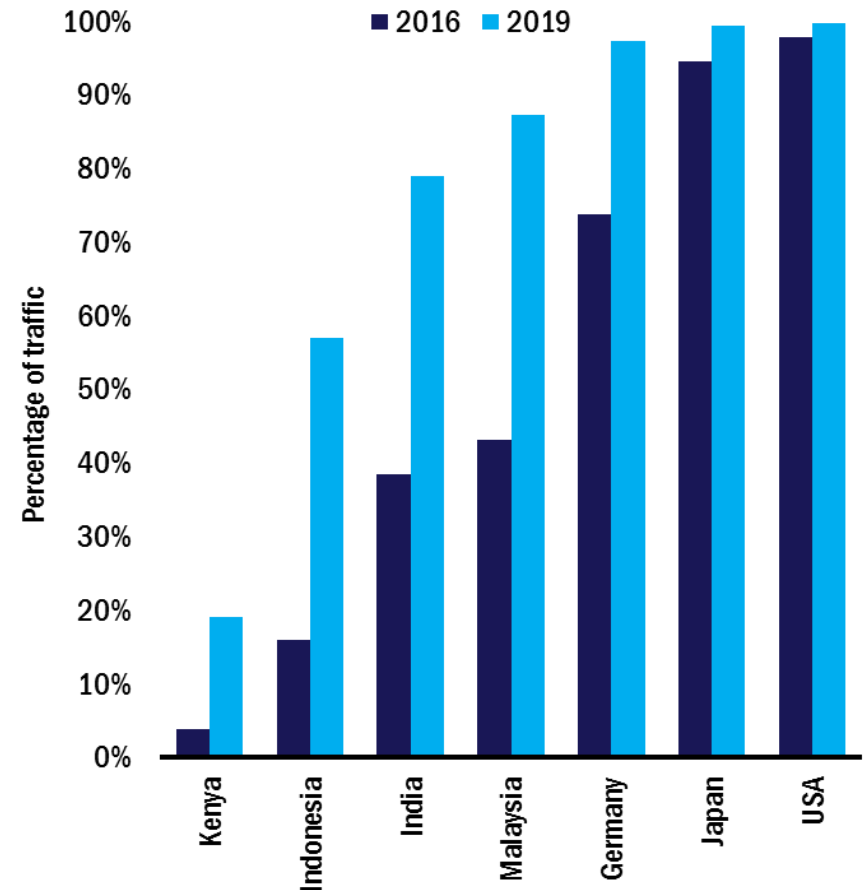
MNOs need to use maximise the capacity of their spectrum holdings, but 2G and 3G still generate revenue, even though they provide inferior spectral efficiency. MNOs must minimise the cost and revenue loss of 2G and 3G network migration, while benefitting from the increase in capacity.

MNOs must repurpose spectrum for LTE use if they are to meet customers' expectations, as mobile traffic becomes increasingly dominated by 4G. Operators in developed markets risk losing revenue and incurring costs by decommissioning 2G and 3G, particularly in the growing IoT segment. Operators must quantify the potential negative consequences of decommissioning legacy networks.

Spectrum availability is often poor in emerging markets, which restricts the amount of spectrum that can be used for more-advanced technologies. This problem is compounded by the large number of 2G customers in many emerging markets and the consequent need to dedicate significant spectrum to 2G.

MNOs must decide how to minimise the risks involved in legacy network migration. Part of the solution to these challenges lies in marketing and pricing, but this report focuses on possible technical approaches. For example, MNOs could use the same spectrum for multiple technologies or several operators could join together to create a single legacy 2G or 3G network.

Figure 2: Percentage of total cellular data traffic from 4G/5G devices, selected countries, 2016 and 2019



Source: Analysys Mason

MNOs must assess the investment cases for various tools to mitigate the risks around 2G and 3G network migration

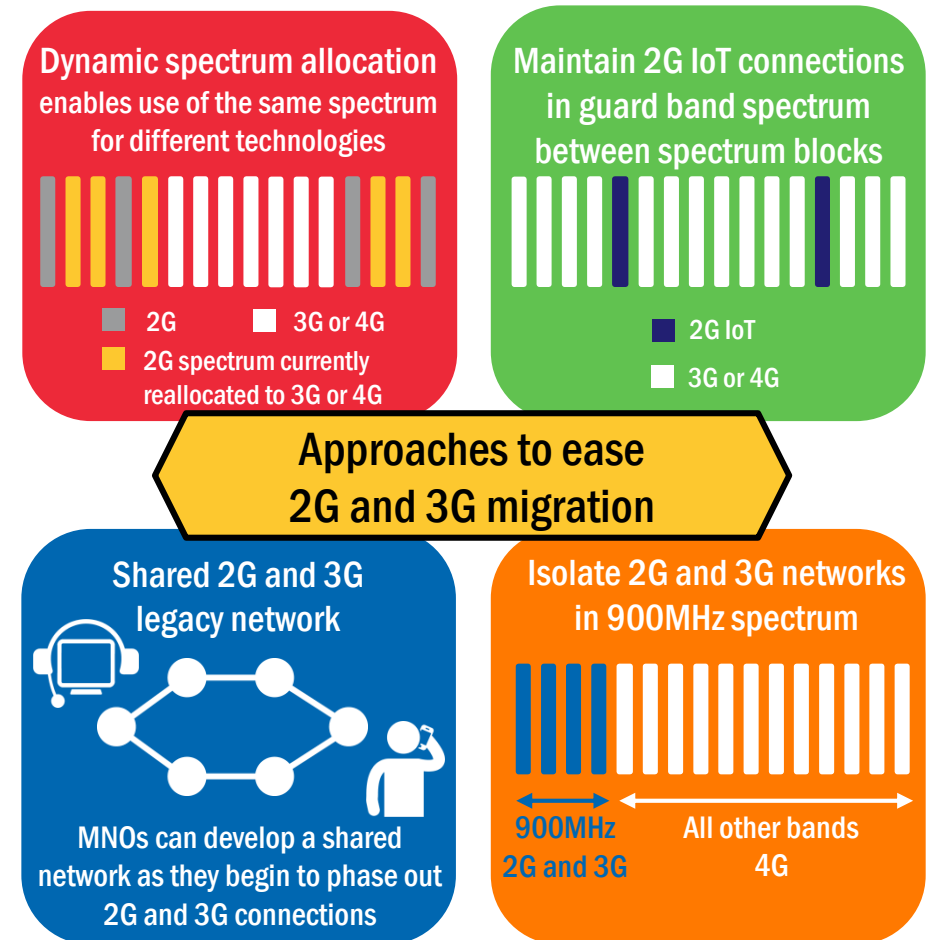
MNOs must plan their 2G and 3G network migration strategies carefully. There is no single solution, but dynamic spectrum allocation across technologies has the potential to significantly ease MNOs' 2G and 3G migration.

The first section of this report examines the potential cost and revenue impact of network decommissioning in developed markets. It quantifies the financial impact of decommissioning by drawing on real world examples, such as AT&T and Telstra.

The second section of this report assesses the potential challenges around 2G and 3G network migration in emerging markets. It examines the importance of legacy technologies to emerging market MNOs in terms of connections and revenue and considers how much spectrum is being used to support such connections.

The report concludes by examining the business cases for four approaches that operators could use to smooth the path to the final decommissioning of 2G and 3G networks. It examines the case for MNOs investing in dynamic spectrum allocation, which enable the same spectrum to be used for different technologies. It assesses the potential for MNOs to accommodate 2G IoT in guard band spectrum and also gauges the viability of models where MNOs in a country develop shared networks for 2G and 3G. The report also examines easing the decommissioning process by isolating 2G and 3G in lower band spectrum, separate from 4G.

Figure 3: Approaches to easing the 2G and 3G migration process



Source: Analysys Mason

Recommendations

1

Most operators with significant numbers of 2G IoT connections should decommission their 3G networks first.

The cost of changing large numbers of 2G IoT connections to other technologies will be prohibitive for most operators. MNOs that pass on the 2G IoT replacement costs to end customers will also risk considerable churn and loss of revenue in this growing segment.

2

Dynamic spectrum allocation enables spectrum sharing between 2G and more-advanced technologies and can generate significant benefits for developed and emerging market operators.

Dynamic spectrum allocation can be a cost-effective way for operators to benefit from a capacity increase. This approach offers theoretically easy implementation through a software upgrade, but does have the limitation of requiring deployment of single RAN technology from a particular vendor.

3

Shared 2G/3G networks can deliver benefits for operators, but this strategy will not be applicable in all markets.

Network sharing agreements for 2G/3G can assist MNOs in smoothing the process towards the final decommissioning of these networks. However, such agreements must address regulatory challenges (such as whether spectrum sharing between operators is permitted), as well as whether the shared network will be run for profit or simply to cover costs.

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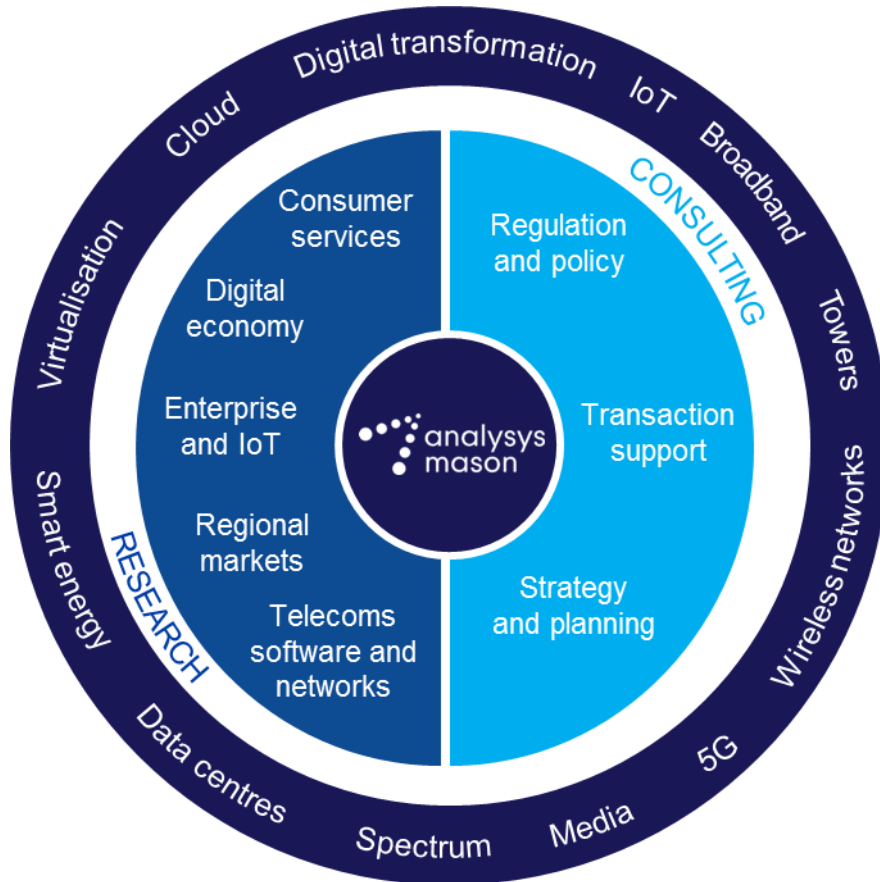
About the author



Stephen Wilson (Principal Analyst) contributes research to our *Fixed Networks* research programme. He joined Analysys Mason as a Senior Analyst in November 2012, having previously worked for Informa Telecoms & Media. Stephen has more than 5 years of experience covering the telecoms industry and specialises in analysing fixed broadband access technologies and strategies, as well as developments in European telecoms markets across fixed and mobile sectors. He has produced reports on DSL acceleration technologies as well as regular updates on European markets, notably in Central and Eastern Europe. Stephen is a graduate in Politics, Philosophy and Economics from St Catherine's College, Oxford University.

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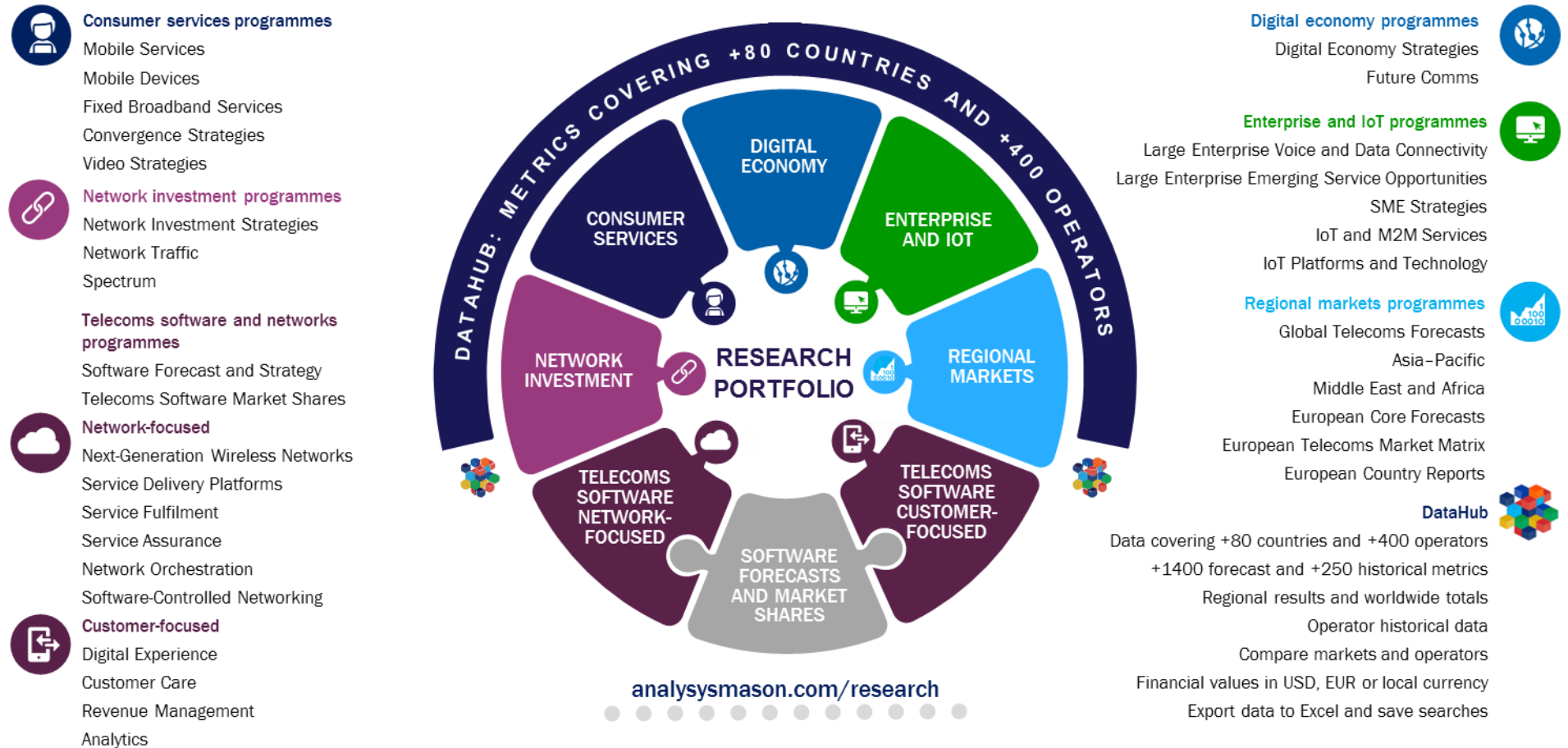
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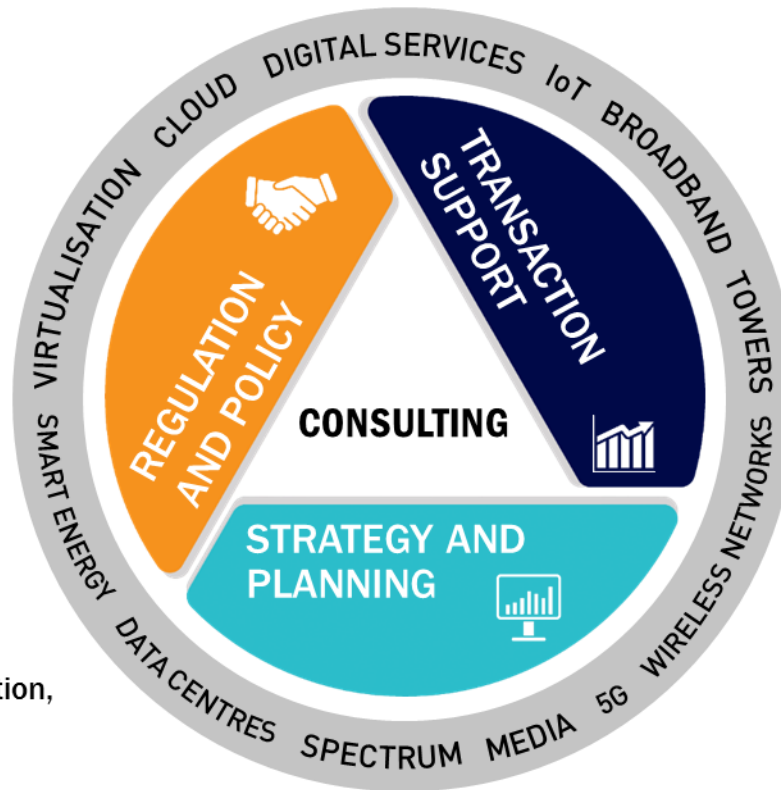
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