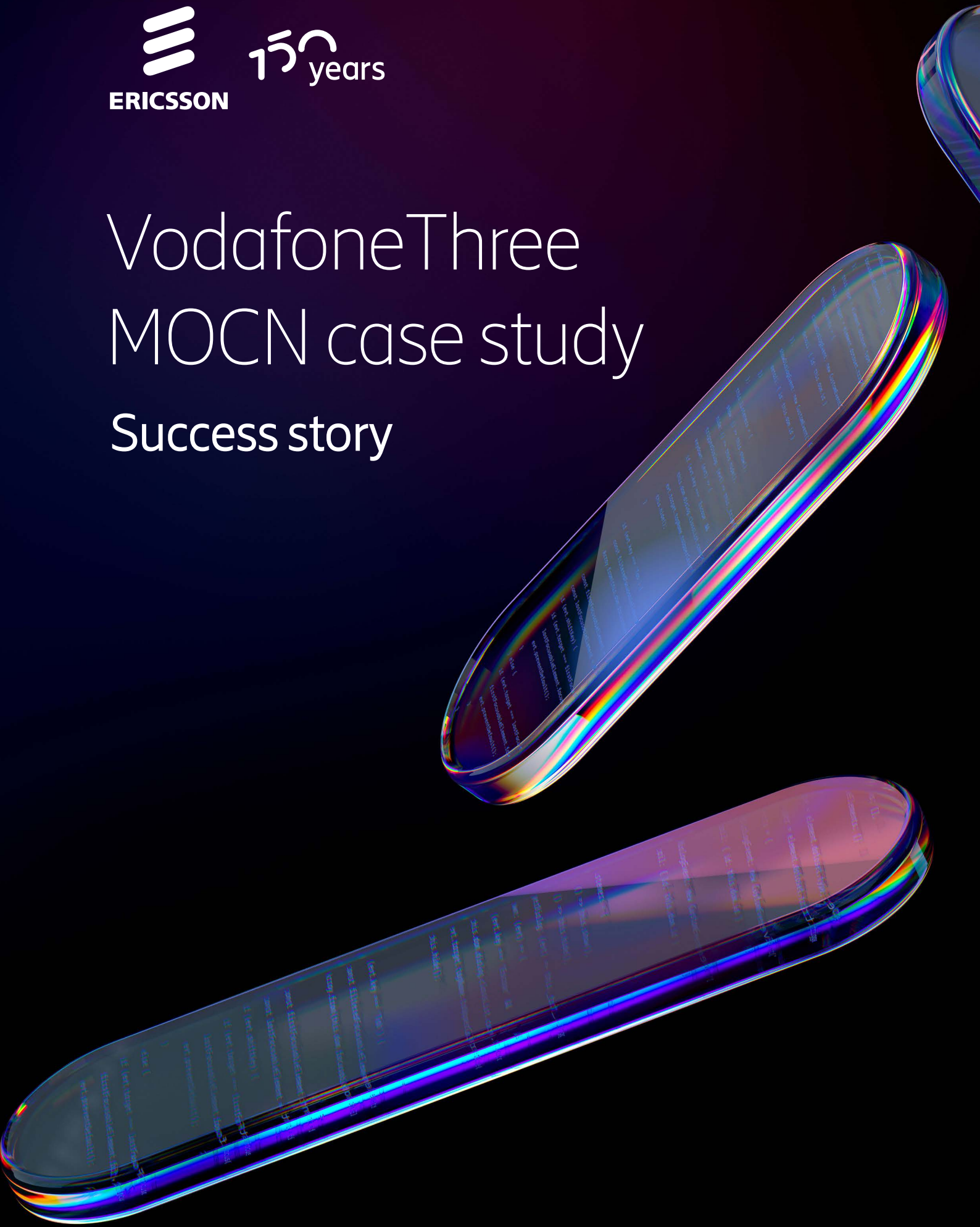




150 years

VodafoneThree MOCN case study Success story



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Executive summary

In June 2025, the merger of Vodafone and Three UK created VodafoneThree. It opened a rare opportunity to build the UK's leading national mobile network. By combining complementary low, mid, and high-band spectrum and consolidating the RAN in a phased, disciplined manner, VodafoneThree can significantly enhance coverage, capacity, and customer experience while reducing long-term cost. The integration is technically complex and centres on four core challenges.

A world-first network upgrade, successfully unifying core-level sharing through 'Multi-Operator Core Network' (MOCN) technology with its existing 'Multi-Operator Radio Access Network' (MORAN) infrastructure over a multi-vendor 4G and 5G network.

- **Spectrum harmonisation:** Re-farm and re-band across two legacy portfolios.
- **Multi-operator coexistence:** Orchestrate multi-operator core network (MOCN) and multi-operator radio access network (MORAN) at a national scale without service degradation.
- **Multi-vendor interoperability:** Integrate radio, core, and transport domains seamlessly.
- **Traffic dynamics:** Manage mobility and congestion risks during non-contiguous or pepper-potted activations and uneven traffic migration.

A pragmatic, two-phase integration strategy

To navigate these complexities, VodafoneThree has adopted a phased program, designed to balance speed-to-market with rigorous risk management.

- **Phase 1, easy MOCN:** It involves rapid activation using existing hardware and each operator's spectrum. Prioritize the right sites to unlock immediate coverage and capacity gains for millions of customers, while building operational confidence and governance discipline.
- **Phase 2, full MOCN:** It involves complete consolidation through site upgrades, full spectrum rationalisation and stacking, deeper carrier aggregation, and simplification into a resilient, shared RAN optimised for 5G Standalone.

Execution discipline as the differentiator

Success relies on robust governance. VodafoneThree uses a strict framework comprising lab and field validation, definitive key performance indicator (KPI) gates, automated rollback protocols, and cross-functional working groups. This ensures that technical, operational, and regulatory risks are tightly controlled throughout the migration.

Early field deployments have already validated this approach. The data shows material improvements in 4G and 5G reach and throughput, confirming the technical strategy and the migration path toward a high-performance national network that unlocks the full commercial value of the merger.

Introduction: building the UK's digital future

In June 2025, the merger of Vodafone and Three UK created VodafoneThree. The objective was a clear: eliminate structural connectivity gaps and build the UK a leading mobile network.

Backed by a GBP 11 billion investment, VodafoneThree will deploy a nationwide 5G Standalone (SA) network reaching 99 percent population coverage by 2030 and 99.96 percent by 2034, supporting the nation's digital inclusion and productivity ambitions.

VodafoneThree commitments: early value realization

While full integration of the two networks is a multi-year program, early results are tangible:

- **Service continuity:** customers can access both networks seamlessly through software enablement, without requiring major network upgrades and without any additional cost to customers.
- **Customer performance:** Net Promoter Score (NPS)—a key measure of customer loyalty and willingness to recommend the service—has improved, while churn has reduced year-on-year.
- **Broadband scale:** gigabit broadband now reaches 23.2 million homes and businesses.

Vodafone and Three merger addresses the structural business challenges

Consolidation directly tackles three long-standing market constraints:

- **Digital divide:** greater network scale and long-term capital investment enable permanent elimination of coverage not spots, improving connectivity in underserved areas. By providing 4G coverage to areas of the UK where it wasn't previously available to either brand's customers, VodafoneThree has removed 16,500km² of not spots, an area ten times the size of London.
- **5G SA acceleration:** nationwide deployment of 5G SA requires deeper spectrum holdings and significant investment, which are easier to achieve through consolidation.
- **Customer simplicity:** integration reduces friction between mobile and broadband, improving reliability nationwide.

The Ericsson partnership: accelerating impact through MOCN

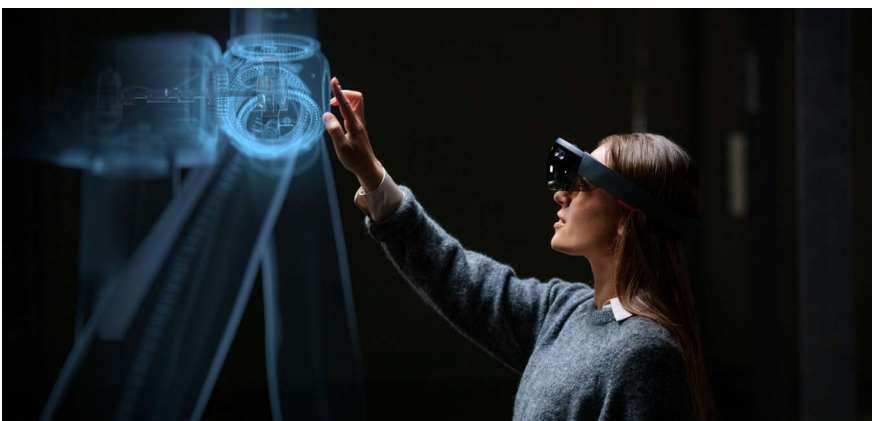
A cornerstone of this early success is the deployment of MOCN technology. Sharing mobile networks is inherently complex, with several possible sharing models available, and each involving different levels of integration across spectrum, infrastructure, and operations.

Among these options, the MOCN model was selected as the most suitable approach. Through the strategic partnership with Ericsson, MOCN has enabled a smooth and efficient integration of the networks.

Ericsson led the end-to-end technology design, allowing the two networks to operate as a shared resource while maintaining separate cores. This approach balances rapid rollout with long-term scalability, delivering three key benefits:

- **Speed to Market:** rapid deployment of shared capabilities without waiting for physical site consolidation.
- **Seamless experience:** up to 28.6 million customers can automatically connect to the best available signal across both networks.
- **Operational efficiency:** sharing resources has unlocked immediate capacity and spectrum efficiency.

The result is measurable early value and a scalable foundation for nationwide 5G SA.



Technical framework for VodafoneThree network integration

The consolidation of Vodafone UK and Three UK marks a structural shift in national infrastructure. By combining complementary low-band for coverage, mid-band for capacity, and high-band for throughput, VodafoneThree has the assets to build the UK's best network. Realizing that potential, however, requires disciplined engineering to merge two live national grids without service disruption. The program is defined by five technical imperatives:

- spectrum rationalization
- signalling harmonization
- multi-vendor interoperability
- mobility management
- operational coexistence

Spectrum strategy: rationalisation and phased evolution

The merger enables significant spectral efficiency gains through refarming, re-banding, carrier aggregation (CA), and dual connectivity. However, integrating different band plans demands careful sequencing to avoid customer impact. VodafoneThree is executing a two-phase approach:

- **Phase 1 – Logical integration (speed and value):** In this phase, the spectrum remains physically separate. Each operator uses its native spectrum on hosted MOCN sites delivering immediate coverage and capacity gains for millions of users without complex site consolidation. For instance, the bandwidth of 1800 MHz spectrum was increased to 20 MHz from 15 MHz, providing an immediate capacity improvement.
- **Phase 2 – Physical consolidation (resilience and performance):** Spectrum is progressively unified at the site level through wideband radio deployment and physical antenna swap. Sites are upgraded to support consolidated spectrum portfolio, enabling CA across previously separate spectrum assets rather than operating them independently. This approach unlocks

larger contiguous spectrum blocks and deeper aggregation layers, significantly improving 4G and 5G network performance, capacity, and spectral efficiency.

The hidden cost of harmonisation: user equipment capability signalling

When two mobile networks are merged, the combined radio network must support several possible combinations of technologies, spectrum, devices, and network features. As a result, mobile devices and the network need to exchange more information when they connect.

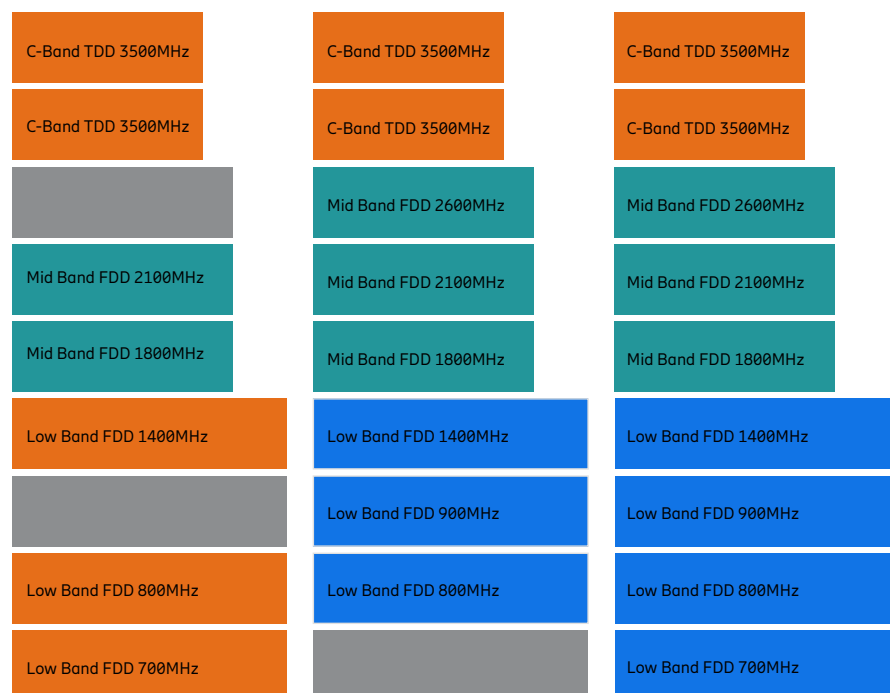
This increase in signalling traffic overhead creates three key considerations:

- Connection setup time: larger signalling messages can slightly increase the time it takes for devices to establish connections or move between cells.

- Performance at the cell edge: In areas with weaker signal conditions, exchange of complex signals increase the risk of connection delays or failures.
- Vendor interoperability: different equipment vendors may implement signalling features differently, which can increase network processing requirements and make optimization more complex.

The benefits of a combined network are substantial, but achieving the full performance gains requires careful management of signalling complexity alongside spectrum integration.

Illustrative diagram of spectrum layers:





Multi-vendor design and interoperability

Both legacy networks were originally deployed using multiple RAN vendors across different regions. As a result, the merged VodafoneThree network operates in a multi-vendor environment, where equipment from different suppliers must work together within a shared radio infrastructure.

While this approach improves resilience and avoids dependence on a single supplier, it also introduces integration complexity. The shared RAN must support devices connected to multiple core networks, which exposes two key challenges:

- **Protocol divergence:** small differences in 3GPP interpretation—such as quality of service, timing, and feature mapping—can cause functional gaps and performance degradation. In addition, some vendors introduce proprietary features or optimizations that comply with the standard but are designed to work best within their own ecosystem. When deployed in a multi-vendor environment, these features may not interoperate seamlessly, potentially creating compatibility gaps or performance inconsistencies.
- **Core-anchoring limits:** RAN software designed for a single operator can hit static table or protocol-instance limits when supporting many MMEs/AMFs, often requiring vendor software fixes.

To manage this risk, VodafoneThree applies a vendor-agnostic framework with standardized functional criteria, harmonized parameter profiles, a rigorous multi-vendor test regime, and clear remediation service level agreements (SLAs) with suppliers to minimize rework while preserving vendor innovation.

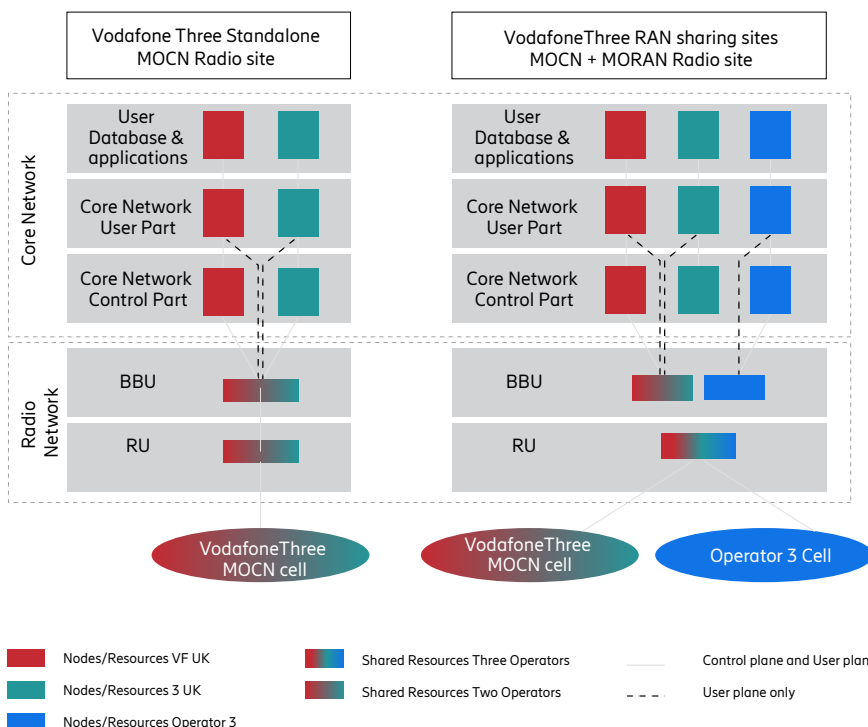
Managing the RAN sharing mix

The complexity further increases when VodafoneThree hosts other operators at the same sites under Multi-Operator Radio Access Network (MORAN) agreements. MORAN is a technology that allows competing operators to share the same radio access network (RAN) infrastructure while continuing to use their own spectrum and core networks with the aim of reducing deployment costs. Spectrum upgrades in these shared areas therefore

require precise radio frequency planning to avoid disruption to tenant operators, particularly in dense urban environments where interference risk is higher and rollout priorities may differ.

A strict governance model, including joint technical forums and KPI-based release gates, ensures transparent spectrum activation, regulatory compliance, and consistent service quality for all hosted operators.

Illustrative diagram of MOCN and MORAN architecture



“Working closely with Ericsson, and thanks to the continued efforts of our teams across VodafoneThree, we’ve completed a hugely complex network improvement programme that is already delivering real-world impact for our customers.”

Iain Milligan
(Network Development & Infrastructure Director, VodafoneThree)

Mobility complexity in pepper-pot deployments

Because the legacy networks were deployed using multiple vendors, each operating with different spectrum assets and configurations, integrating the networks creates additional complexity. The pepper-pot approach—selective MOCN deployment on non-contiguous, high-impact sites—accelerates early benefits but can also create an uneven network topology and introduce mobility management challenges.

- **Localized congestion risk:** on shared MOCN sites, additional traffic from the partner network can overload sites with lower capacity. Mitigation requires automated congestion detection and protection mechanisms, such as traffic shaping or controlled rollback, combined with a prioritized upgrade pipeline for affected locations.
- **Constrained mobility trade-off:** in phase 1, the MOCN handovers may be limited to certain bands to avoid adding traffic to already congested spectrum. This helps protect network stability but may reduce seamless mobility in some scenarios. The constraint will gradually ease as the network evolves toward full MOCN in phase 2, when additional capacity becomes available.

In short: pepper pot delivers rapid, targeted gains but requires tight RF planning, dynamic protection, and a clear consolidation roadmap.

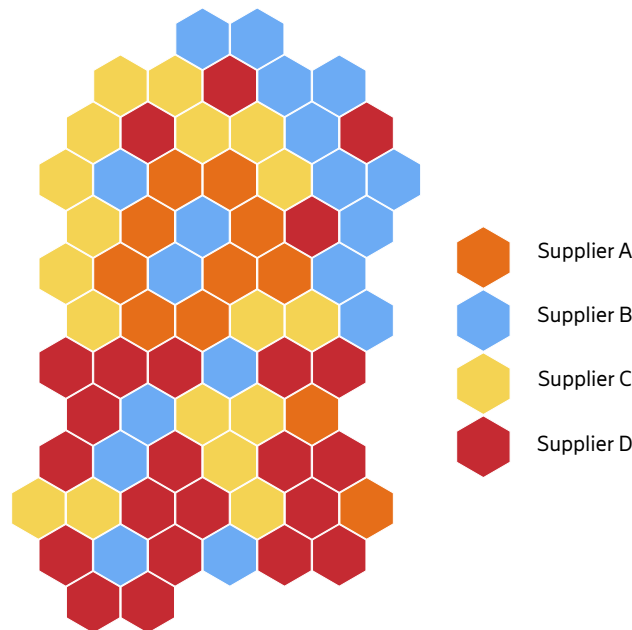
Operational coexistence: the two-front integration

Merging two national operators creates immediate operational and contractual complexity across two priority fronts: IT/tooling integration Operations Support System and Business Support System (OSS/BSS) and Inter-Operator Interconnects (NNIs). Both must be resolved quickly to protect service continuity, compliance and commercial settlement.

Key risks — OSS/BSS:

- Data and configuration fragmentation: dual inventories and southbound toolchains cause duplicate or conflicting changes.
- Process divergence: different SLAs, alarm thresholds and maintenance windows impede coordinated operations.
- Security and tenancy: inconsistent access, key management and data-segmentation increase regulatory and privacy risk.

Illustrative diagram of multi-vendor site boarder (Pepper-pot)



Key risks for NNIs

- Broad technical scope: Signalling System No. 7 or Session Initiation Protocol SS7/ SIP voice, DIAMETER/ Stream Control Transmission Protocol (SCTP) signalling, service gateway interference (SGi) peering and IP Multimedia Subsystem or Session Border Controller (IMS/SBC) integration each require bespoke security and QoS mappings.
- Interoperability scale: multiple vendors and SBCs create a large testing matrix that must be prioritised.
- Routing and compliance: emergency services, numbering, lawful-intercept and portability need immediate reconciliation.
- Capacity and resilience: NNIs must be sized and protected for combined peak loads and DDoS threats.

Summary

The technical challenges of the VodafoneThree merger are not merely logistical but structural. By addressing spectrum harmonization, mobility logic, and operational coexistence head-on, the engineering strategy converts these complexities into the foundation of a resilient, high-performance national network.



VodafoneThree phased MOCN strategy

VodafoneThree's technical foundation is MOCN. As mentioned previously, MOCN is a shared RAN with separate cores that combines complementary spectrum to deliver immediate coverage and capacity gains and accelerate 5G performance, while managing execution risk and capital outlay. The program follows a disciplined two-phase approach to balance speed with long-term optimisation.

Phase 1: easy MOCN – rapid value realisation

- Objective: to deliver immediate customer benefit using existing assets and minimal physical work.
- Approach: enable MOCN on carefully selected priority sites, pepper-potted across vendor or grid boundaries to validate multi-vendor interoperability, mobility and coexistence at scale.
- Spectrum contributions (shared RAN):
- Vodafone UK: 5G N78 (3.4–3.6 GHz); long-term evolution (LTE) B7, B38, B1, B3, B32, B8, B20
- Three UK: 5G N78; LTE B1, B3, B32, B20, B28
- Outcome: material, near-term uplift in reach and throughput with controlled regulatory and operational risk; establishes tools, governance and operational confidence for wider rollout.

Phase 2: full MOCN – structural consolidation

- Objective: to convert logical sharing into a fully optimized shared network by completing site upgrades and harmonizing technology stacks.
- Key activities: spectrum rationalisation (refarm or re-band), carrier reassignment, deep band-stacking (CA / EN-DC) and selective use of dynamic spectrum sharing (DSS).
- Outcome: contiguous spectrum blocks, deeper aggregation, improved spectral efficiency and peak 4G/5G performance.

Execution discipline: the governance framework

- Gate-based program: lab validation, live pilots and KPI-driven acceptance gates before wider rollouts.
- Protection measures: automated rollback procedures and staged activations to prevent service impact.
- Cross-functional oversight: RF planning, OSS/BSS, transport and core teams coordinate changes; joint vendor remediation paths reduce integration rework.

Result

A phased, controlled migration that delivers immediate customer benefits and progressively realizes the full technical and commercial value of the VodafoneThree merger.

Bringing our networks together marks a major milestone for VodafoneThree. The result is a single, intelligently orchestrated platform that delivers measurable improvements in performance, reliability and efficiency.

Now, up to 28.6 million customers are experiencing higher speeds for everyday browsing and streaming, as well as improved coverage and reliability when using 4G and 5G.

Through this process, we have also successfully removed 16,500 sq km of not spots – areas that previously had little or no mobile coverage – enabling more customers in more places access to reliable connectivity.

Nicola Binucci
(Network Design Planning and Optimisation Director, VodafoneThree)

The results

As a result of Easy MOCN, by April 2026, up to 28.6 million customers, spanning more than 10,000 locations, are automatically using each other's network, getting the best available coverage, at no extra cost.

This has eliminated 16,500km² of mobile not spots, improved speeds when using 4G and 5G, and boosted network capacity and resilience to provide a better experience for all customers.

MOCN rollout by October 2025 showed significant increase in data growth on both 3UK and VF sites selected for purpose of fulfilling previous LTE and New Radio (NR) coverage gaps

Increase in LTE and NR coverage for both Vodafone and Three UK users, even though not a primary driving force behind the MOCN activation, consequently, has reduced the usage of 3G network in Three UK and 2G network in Vodafone where MOCN was activated.

LTE - 3UK Grid - MOCN

Downlink Data Volume

Total Data Growth: 13.75%

Vodafone Contribution: 10.56%

LTE - VF Grid - MOCN

Downlink Data Volume

Total Data Growth: 34.53%

3UK Contribution: 22.42%

5G NR - 3UK Grid - MOCN

Downlink Data Volume

Total Data Growth: 8.11%

Vodafone Contribution: 3.67%

5G NR - VF Grid - MOCN

Downlink Data Volume

Total Data Growth: 40.06%

3UK Contribution: 25.27%



Acronyms

| | |
|---------------|--|
| BBU: | Baseband Unit |
| RU: | Radio Unit |
| MOCN: | Multi-operator core network, the baseband units, the radio units, and the spectrum cell carriers are shared between the operators. |
| MORAN: | Multi-operator RAN sharing, The baseband units and radio units are shared, while the spectrum cell carriers are dedicated for each operator. |

References

- [Completion of Vodafone and Three merger in the UK](#)
- [VodafoneThree ushers in a new era of connectivity](#)
- [Max Taylor comments on VodafoneThree progress so far](#)
- [VodafoneThree reaches major milestone in building the UK's best network](#)
- [Ericsson to power majority of VodafoneThree next-gen network](#)

About Ericsson

Ericsson's high-performing networks provide connectivity for billions of people every day. For nearly 150 years, we've been pioneers in creating technology for communication. We offer mobile communication and connectivity solutions for service providers and enterprises. Together with our customers and partners, we make the digital world of tomorrow a reality.