MASTERING THE ROUTE TO DISAGGREGATION

OPERATING MODEL #2: SYSTEMS INTEGRATOR LED

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by NGMN Alliance

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00 FOR AN OVERALL INTRODUCTION TO THE OPERATING MODELS, REFER TO THE SEPARATE DOCUMENT #0 TITLED "OPERATING MODELS – AN INTRODUCTION #0". **CLICK HERE** FOR THE DOCUMENT.

***disclaimer:

All operator and vendor examples mentioned in this publication are provided solely for illustrative purposes, serving to clarify the model through concrete examples. References to specific brands or company names are not intended as endorsements or recommendations. NGMN neither endorses nor promotes any particular operator or vendor and has no intention of doing so.

01 EXECUTIVE SUMMARY

A Systems Integrator (SI) consolidates data, services, or functions from multiple sources into a unified product or service. In telecommunications, SIs manage complex systems, including network disaggregation. Operators may choose the SI model to integrate diverse hardware and software while outsourcing roll-out and operations. This approach reduces internal burdens and fosters innovation without significant organisational disruption.

The model is described, and its pros and cons are discussed vis-a-vis the other operating models identified by NGMN in related publications. No recommendation should be inferred from these publications - they are simply to provide the industry with an overview of operating models and the impact on mobile operators. NGMN further notes that the list of models identified in this, and related publications is non-exhaustive. Other approaches may be possible.

SI Operating Models:
There are several SI-led operating models for network disaggregation:

1. **Turnkey Solution:**
   SI manages end-to-end implementation, beneficial for new disaggregated solutions or network swaps.

2. **Build-Operate-Transfer (BOT):**
   SI builds and operates the network for a set period before transferring operations to the operator, allowing gradual organisational adaptation.

3. **Managed Service:**
   SI handles daily operations and maintenance, suitable for operators with limited internal support teams.

4. **Joint Ventures/Partnerships:**
   SI and operator share resources and risks, promoting skill-building and collaboration.

5. **Consultancy/Advisory:**
   SI offers guidance on planning, design, and optimisation without operational responsibilities.

6. **Hybrid Model:**
   Combines various aspects of SI involvement, tailored to specific operator needs.

Implications for Organisations:
Organisational changes vary by SI model:

1. **Turnkey Solution:**
   Requires training for new tools and automation, developing maintenance and operations teams.

2. **BOT Model:**
   Facilitates gradual organisational change with expertise transfer from SI.

3. **Managed Service:**
   Minimal organisational changes, with potential knowledge transfer included.

4. **Joint Ventures/Partnerships:**
   May require setting up new units or divisions, fostering collaboration.

5. **Consultancy/Advisory:**
   Significant internal transformation, developing digital skills and new methodologies (e.g., DevOps, CI/CD).

6. **Hybrid Model:**
   Changes depend on the extent of SI services.

Process and Skills Changes:
applied to some of the sub-models

· **Process Changes:**
   Gradual implementation minimises impact. Strong governance and oversight frameworks are essential.

- **Skills Changes:**
  Operational teams need new skills in virtualisation, cloud technologies, automation, and orchestration. Collaboration between engineering, operations, and IT teams is crucial, with support from SI for smooth transitions.

Conclusions:
Pros:

1. **Vendor Flexibility:**
   Operators can choose diverse vendors, enhancing flexibility and optimisation and potentially reducing operational risks most probably associated with relying on fewer vendors.

2. **Integration Expertise:**
   SIs excel in integrating various solutions and optimising performance.

3. **Reduced Vendor Lock-in:**
   For operators that do not have internal systems integration and/or network operations teams and who presently rely on a smaller sub-set of vendors to perform these functions moving to an (external) SI-led model that allows for more vendors in the network could reduce the operator's reliance on a small group of vendors. Operators should carefully assess and design a strategy for SI engagement.

Cons:

1. **Integration Challenges:**
   Coordinating multiple vendors can complicate integration, requiring strong oversight.

2. **Accountability Issues:**
   Without a lead supplier, resolving issues may take longer and lead to conflicts.

3. **Procurement Adjustments:**
   Dealing with multiple vendors can complicate procurement and coordination processes.

The SI model can be used for disaggregated networks, offering operators flexibility and control. It seems to be ideal for operators seeking to start their disaggregation journey while maintaining some control over technology deployment. Collaboration with experienced SIs eases the transition and supports innovation. This model is well suited for operators with a collaborative culture and those driving innovation with external partners.

02 INTRODUCTION

A Systems Integrator (SI) is an entity or platform that consolidates data, services or functions from multiple sources into a single, unified product or service. They are widely used in telecommunications due to their specialist skills in managing complex systems, such as in delivery of managed services for Enterprise systems, OSS/BSS applications, IoT systems and Cybersecurity. The SI is typically responsible for the end-to-end integration of products and services from various vendors and may also deliver a core element of the service. Likewise, network disaggregation can be achieved using an SI model where the SI acts solely as a systems integrator and may also provide one or more of the products/services comprising the overall solution. The SI in its capacity will implement the solution on behalf of the operator by managing and integrating several hardware and software vendors.

One of the main reasons an operator may choose the SI model for disaggregation is it empowers the operator to choose different elements of the underlying system or product, yet discharge the responsibility of testing, integrating and commissioning of the solution to an external entity. In some cases, the SI may also deliver or support the on-going operations as well. Many operators are still in the early learning phase in deploying and maintaining disaggregated networks. Using an SI could provide the operator more choice to integrate a specific solution by selecting what would be considered as 'best-of-breed' by the said operator, as opposed a lead vendor approach (reference to model 1) where choice would be limited. For example, it may allow the operator to select vendors who can deliver differentiated products in each domain, such as radios or applications in the RAN, which has the potential to foster innovation. However, it may require a different operating model or even organisational transformation to maintain a specialist product. The SI model allows the transition to be made with less impact to the internal teams and organisational structure of the operator. As the SI is taking ownership of full delivery (in some cases partial delivery), it places less burden on the skills and resources requirement of the operator.

Disaggregated networks require a higher level of collaboration between different hardware and software vendors to deliver a solution. If one of the vendors is not taking a lead and/or if it has significant market power in a specific product, solution, or technology then it may be less incentivised to make changes to their respective domain. Additionally, it often takes longer to deliver an integrated solution, and this would be a key drawback of the SI model. Another drawback is the solution may lack the flexibility compared to a solution if an operator were to do the integration themselves. This is because SIs will operate within strict boundaries in terms of the pre-defined scope whereas operators performing their own systems integration may have a wider scope in terms of the objectives for the solution. For an (external) SI-led model, options for exploration or innovation may therefore be limited (e.g. trial a different radio solution in Open RAN). With this, operators would need to have a strong governance mechanism to ensure they are not limited in terms of the best solutions and cost efficiency due to the limitation the SI might have.

Examples of SIs used to build disaggregated networks, particularly with Open RAN can be found among several trials and pilots done over the years. [1].

See for example Vodafone/Capgemini [1] and Accenture [2].

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Use of SIs for deployment of products and services is quite familiar to operators. A role of SI can be broad to include all stages of the life cycle or limited to certain parts. There are several operating models prevalent today for SIs when used to deliver networks. The same operating models can be extended to disaggregated networks. The most appropriate will be determined by the circumstances of the individual operator:

1. **Turnkey Solution:**
   SI is responsible for the end-to-end implementation of the project, including planning, design, deployment, integration and testing. If an operator is trialling a new disaggregated solution or is e.g. planning a swap of radios in an existing network, this option may be preferred.

2. **Build-Operate-Transfer (BOT) Model:**
   The SI builds and operates the network for a specified period before transferring the operations back to the operator. This model allows phased transition to disaggregated networks while the operator builds the expertise required internally. It also limits the initial burden on the operator to execute a significant transformation.

3. **Managed Service Model:**
   The operator hands over the day-to-day operations of the disaggregated network and maintenance to the SI. This model is widely used today for mobile networks where the vendor often provides the maintenance services as a managed service. The requirements are executed via a set of contractually obligated SLAs and KPIs. An operator may adopt this model for disaggregated networks if the internal support teams are small and if there is limited scope to expand on the required skills in-house.

4. **Joint Ventures or Partnerships:**
   The SI and the operator can form a JV or partnership to manage and operate the networks. The model allows both parties to build the skills, share resources while also sharing the risks.

5. **Consultancy or Advisory Model:**
   The SI may offer consultancy or advisory services for the operator, especially assisting with network planning, design and optimisation without taking over the operational responsibilities.

6. **Hybrid Model:**
   Operators with current integrated hardware may use different vendors for network services (e.g. field services from one vendor may be used even if RAN vendor is different). If a certain vendor has specific local expertise or supports certification relevant to local markets, it may have an advantage in delivering some aspects of the SI model.

04 IMPLICATIONS OF SYSTEMS INTEGRATOR LED

4.1 TARGET ORGANISATION TO SUPPORT OPERATING MODEL

The change to the organisational model differs based on the type of SI model adopted, as described in the previous section.

1. **Turnkey Solution:**
   If an operator adopts a turnkey solution from an SI, it will need to develop the skills and the teams for maintenance and operations. The newly deployed disaggregated network may require different tools and automation which the teams would need to be trained on.

2. **BOT Model:**
   The operator can observe the network operations and change the organisation gradually. The BOT model is often associated with some expertise from the SI being transferred to the operator after the initial management period is completed. These new teams would have to be integrated to the existing organisational structure. This would need competency build and organisational build on the operator side to be ready for the transfer. Although, operators are given enough time to prepare.

3. **Managed Service Model:**
   This model is very similar to how the network operations are managed today for most operators. Minimal changes to the organisation can be expected with this SI model and knowledge transfer could be part of the service scope to allow the operator to become flexible, should it decide to change models later on.

4. **Joint Ventures or Partnerships:**
   If JVs or partnerships are executed, the operator may have to transfer some internal resources to a new organisational unit or set up a completely new unit or division to manage the network. The organisation would need to adapt to support much more collaboration.

5. **Consultancy or Advisory:**
   The operator would have to transform the organisation to manage the disaggregated network in-house. This includes development of digital skills and introducing different ways of working (e.g. CI/CD, DevOps). The SI may offer support and guide the operator through the transition.

6. **Hybrid Model:**
   The exact nature of the organisational changes will depend on the extent of the service provided by the SI.

In general, if an operator were to rely on an SI for disaggregated networks who is not the main hardware or software vendor, it will have to provide (or facilitate) key requirements not readily available with the SI (e.g. lab space). The programme management office (PMO) and governance team will need to play a key role in delivering the required objectives of the SI-delivered venture.

3.1.1 Process Changes

The process changes can be executed gradually by using an SI for disaggregated networks. The SI could help to minimise the impact to the current processes and operations of the network operator. Where the SI plays a more collaborative or partnership role, the strategic alignment is crucial in mitigating process silos between different infra domains.

Governance and oversight frameworks would need to be implemented, such as steercos, exec level meetings, and programme groups to ensure the stated objectives are delivered in a timely manner. The procurement and contractual management will need to be widened to include the different aspects of the SI delivered system.

Performance management would need more formal governance via KPIs and SLAs that are contractually bound. As some operators are still in transition to disaggregated networks, the solution should have flexibility to adapt. Therefore, particular emphasis should be given to the change management agreed with an SI led model at the outset to avoid commercial penalties from the SI at a later stage.

3.1.2   People (Skills) Changes

Managing disaggregated networks requires new skills to be developed by the operational teams. They include skills on virtualising and cloud technologies. Teams would need an appreciation of cloud architectures, such as NFV and CNF, automation and orchestration tools for managing containerised network functions. The operator would need to work with the SI as well as other partners to identify the internal skills gap and implement training programmes in a timely manner.

One of the biggest changes to the organisation is the structure and the 'way of working'. Operators may currently maintain separate divisions to manage engineering, operations and IT. Disaggregated networks call for new methodologies such as DevOps and CI/CD pipelines to deliver change. It is a different mindset that is required from a traditional telco environment, where collaborations between teams internally working in different domains is essential. An SI can support the operator in making those transitions gradually. For such an organisational transformation, the SI can support with its elastic capabilities, ensuring strong cross skilling aligned with the target governance model across domains. The extent will depend on how much the operator relies on the SI as a key partner in the long term.

05 CONCLUSIONS

IN SUMMARY, THE SI MODEL OFFERS THE FOLLOWING ADVANTAGES AND TRADE-OFFS:

In summary, the SI model offers the following advantages and trade-offs:

Pros

1. Vendor flexibility:
The operator can choose from a variety of hardware and software vendors, increasing the flexibility and possibility of optimisation to specific requirements.

2. Integration Expertise:
SIs have expertise in integration of different vendor solutions and optimising them. They may also have experience in working or exposure to the vendors required for disaggregated networks that the operator may not have dealt with before. For example, an operator may not have had to deal directly with CaaS suppliers and have little expertise in the domain.

Reduced Vendor Lock-in:
For operators that do not have internal systems integration and/or network operations teams and who presently rely on a smaller sub-set of vendors to perform these functions moving to an (external) SI-led model that allows for more vendors in the network could reduce the operator's reliance on a small group of vendors.

Cons

1. Integration Challenges:
Coordinating multiple vendors can lead to integration challenges. It can be more complex with an SI led model compared to single vendor led model and hence can take a longer time and might require extensive testing. The operator will have to execute strong oversight and governance to ensure smooth delivery.

2. Accountability Issues:
With a lead supplier not taking ownership, identifying and resolving issues may take longer. Suppliers may not be proactive in executing changes in their respective domains. This can lead to conflicts and disagreements.

3. Procurement Process Major Adjustments:
This may become complicated as operators would need to deal with several vendors - hardware, software and services - while having only one entity to be responsible for most, if not all.

In recognition of the transformational changes required for an operator, engaging an SI with experience in successfully deploying similar network solutions, can ease the transition. It also offers the operator a degree of control on the technology being deployed. This model may be considered by operators who want to start on the disaggregation journey while seeking some level of control on the destination but perhaps not have the internal resources to manage it fully in-house as opposed to building the solution fully in-house. Operators who have a culture of working collaboratively or driving innovation with external partners will be more adaptable with the SI model of disaggregated network delivery.

06 REFERENCES

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NEXT GENERATION MOBILE NETWORKS ALLIANCE

NGMN is a forum established in 2006 by world-leading Mobile Network Operators. NGMN is a global operator-led alliance comprising nearly 70 companies and organizations, including operators, vendors and academia.

Its objective is to ensure that next generation network infrastructure, service platforms, and devices meet the requirements of operators and address the demands and expectations of end users.

VISION

The vision of NGMN is to provide impactful industry guidance to achieve innovative, sustainable and affordable mobile telecommunication services for the end user with a particular focus on Mastering the Route to Disaggregation, Green Future Networks and 6G, whilst continuing to support 5G's full implementation.

MISSION

The mission of NGMN is:

- To evaluate and drive technology evolution towards the three **Strategic Focus Topics:**

  - **Mastering to the Route to Disaggregation:**

    Leading in the development of open, disaggregated, virtualised and cloud native solutions with a focus on the E2E Operating Model

  - **Green Future Networks:**

    Developing sustainable and environmentally conscious solutions

  - **6G:**

    Anticipating the emergence of 6G by highlighting key technological trends and societal requirements, as well as outlining use cases, requirements, and design considerations to address them.

- To define precise functional and non-functional requirements for the next generation of mobile networks

- To provide guidance to equipment developers, standardisation bodies, and collaborative partners, leading to the implementation of a cost-effective network evolution

- To serve as a platform for information exchange within the industry, addressing urgent concerns, sharing experiences, and learning from technological challenges

- To identify and eliminate obstacles hindering the successful implementation of appealing mobile services.