Valid

From Entitlement to Orchestration in the eSIM Era

How Mobile Operators Can Orchestrate eSIM Activation, Device Entitlement, and Service Monetization at Scale



Valid

About Valid

Valid is your trusted partner for interoperable mobile and IoT connectivity services worldwide. We excel in offering solutions for identity, mobile, and payment ecosystems, driving digital transformation in people's lives by supporting various journeys, including authentications, monetization, and transactions, in both public and private sectors.

With nearly seven decades of expertise in the market, we deliver complex solutions involving high volume and sensitive data. The company integrates the best available technologies to drive innovation and provide secure, efficient solutions to its clients. Currently, Valid has more than 3,000 employees across 15 countries dedicated to creating a more fluid, connected, reliable, and safe world.

FIND OUT MORE ABOUT US AT:

valid.com | trustedconnectivity.valid.com

FOLLOW US ON SOCIAL MEDIA:

LinkedIn | Facebook | Instagram

AUTHOR(S):

Ruben Cantano – Product Manager at Valid

Caio Hamer – Marketing Director at Valid

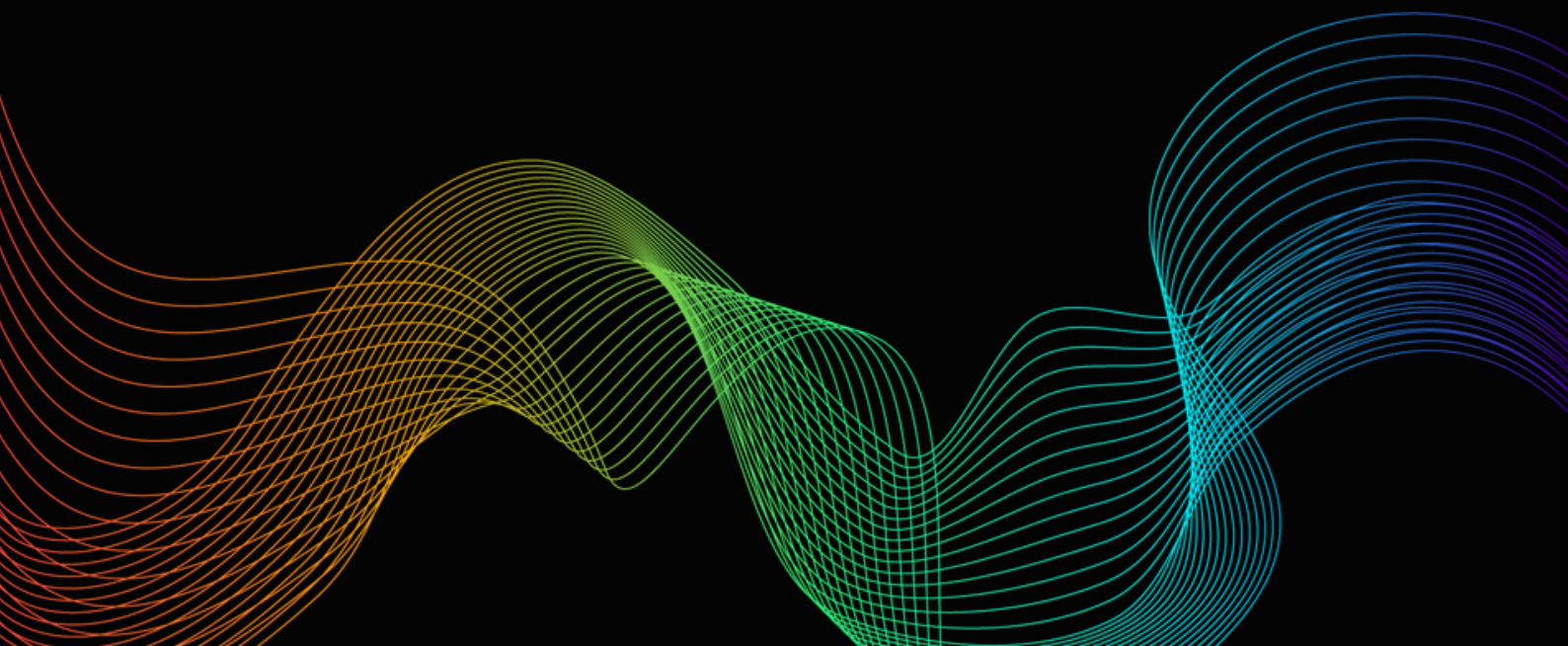


Table of contents

Executive Summary 4

The eSIM Era Raises the Bar 5

The Role of the Entitlement Server 6

Architecture & Standards 7

From Authorization to Business Value 8

Why DES Alone is Not Enough 9

The Orchestration Model 10

Operators are progressively moving toward three operating models 11

Operational Governance and Observability 12

Real-World Impact: From Fragmentation to Orchestration 12

Conclusion 13

Glossary 14

References 15

Executive Summary

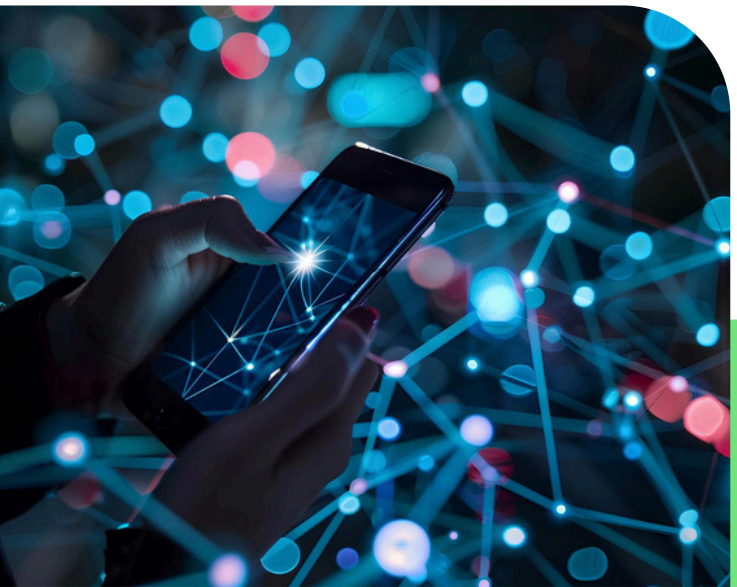
eSIM has evolved from a provisioning alternative into a strategic foundation for digital connectivity.

Across smartphones, wearables, and connected devices, operators are now expected to deliver instant activation, seamless onboarding, and consistent multi-device experiences. However, **profile download alone does not guarantee service readiness.**

Before services such as VoLTE, VoWiFi, 5G, or companion-device plans can be activated, operators must validate whether the subscriber, device, and service combination is authorized in real time. This is the role of the **Device Entitlement Server (DES)**.

Under GSMA TS.43 and OEM frameworks, DES acts as the **policy and decision layer** that determines service eligibility and ensures the correct experience is delivered on the correct device.

Yet, as operators scale digital onboarding, a new challenge emerges: **Entitlement alone is not enough.**



Modern onboarding journeys span multiple systems: apps, SM-DP+, identity, CRM, notifications, and support. When DES is deployed in isolation, operators face fragmented integrations, limited visibility, and slower time to market.

The industry is therefore shifting toward a new model: **DES as part of an orchestration layer.**

When integrated into an orchestration platform such as **SM-Connect**, operators gain:

- A single control pane across onboarding journeys
- Reduced integration complexity
- End-to-end operational visibility
- A scalable foundation for future eSIM and IoT use cases

This orchestration model enables a **Single Pane of Glass** across the entire eSIM lifecycle, providing unified visibility, control, and scalability.

Ultimately, this approach transforms eSIM from a provisioning mechanism into a **fully orchestrated, service-driven platform.**

The eSIM Era Raises the Bar

The mobile industry is transitioning from physical SIM activation to digital, software-driven onboarding.

But expectations have changed:

- Activation must be instant
- Services must be immediately usable
- Experiences must be consistent across devices and channels

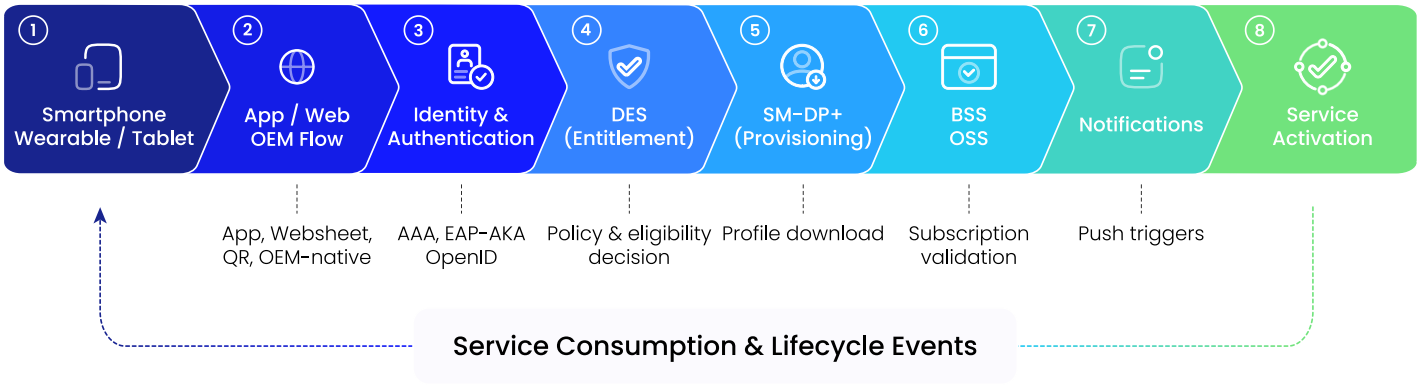
Activation has been redefined

Activation is no longer defined by connectivity, but by service readiness.

Download ≠ Activation

Installing an eSIM profile does not guarantee service readiness. **True activation depends on real-time validation** of the subscriber, device, and service combination.

End-to-End eSIM Onboarding Flow



Activation is not a single step - it is a coordinated, multi-system journey.

The Role of the Entitlement Server

The Device Entitlement Server acts as the control layer for real-time service authorization.

It determines:

- Whether a service can be activated
- On which device
- Under which conditions

DES is a control layer, not a middleware.
It enables real-time, device-aware service authorization.

Core Use Cases

VoLTE / VoWiFi / 5G
Service Authorization

Companion Devices
SmartWatch / MultiSIM

eSIM Transfer
Device Upgrade / Migration

Digital Onboarding
Websheet / App-based flows

Phone Number Verification
Number / Subscriber Validation

Future IoT
Multi-device orchestration

From fragmented integrations to a unified control plane.

Emerging & Extended Use Cases

As new connectivity models emerge, entitlement frameworks are expanding beyond traditional voice and data services.

- **RCS (Rich Communication Services)**
  Device and service eligibility validation for advanced messaging features, particularly in OEM-driven environments.

- **Satellite Connectivity**
  Conditional service enablement based on device capability, network availability and subscription entitlements.



Architecture & Standards

This paper focuses on the components directly involved in real-time service activation and authorization. While the broader eSIM architecture includes elements such as eUICC, SM-DS, and device-side components (e.g., LPA), the scope here is centered on the **control and decision layers** that govern activation outcomes.

This distinction is critical for operator architecture design:

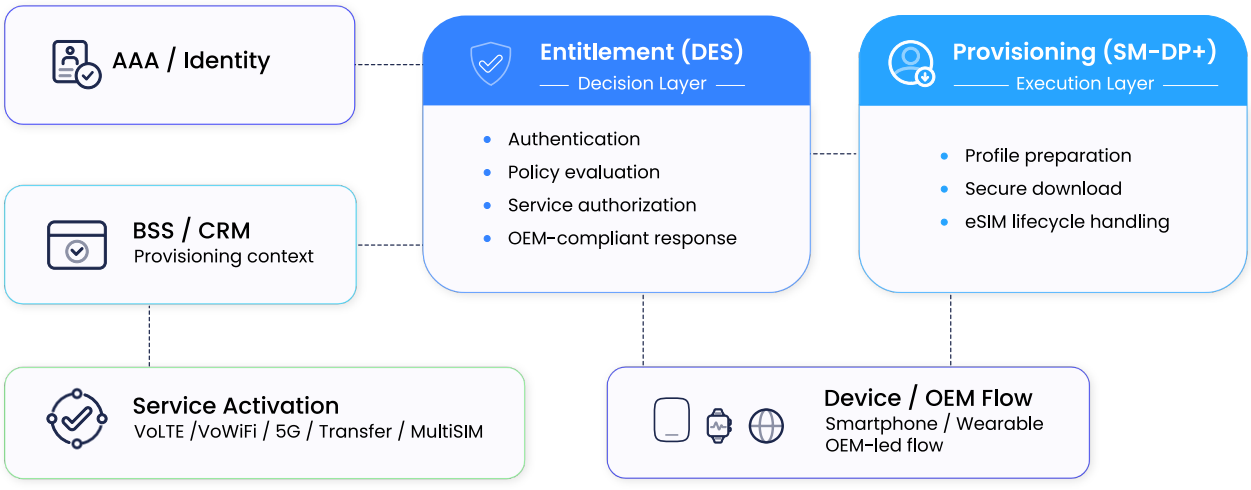
- DES = authorization (decision) layer
- SM-DP+ = provisioning (execution) layer

A production-grade DES must be anchored in:

- GSMA TS.43 (primary standard)
- OEM ecosystems (Apple, Google/Android, Samsung)
- Supporting frameworks (AAA, EAP-AKA, OpenID Connect)

Together, these layers define the core decision and execution functions within the eSIM activation process. However, **they do not by themselves ensure seamless, end-to-end activation** across systems and channels, where **additional coordination is required**.

eSIM Service Activation Architecture



The Device Entitlement Server (DES) governs service decision, while SM-DP+ executes provisioning actions.

In addition to these layers, operator BSS and OSS systems provide the commercial and operational context (such as subscription data, customer information, and service configuration) on which entitlement decisions depend, but **are not directly part of the real-time activation control flow**.

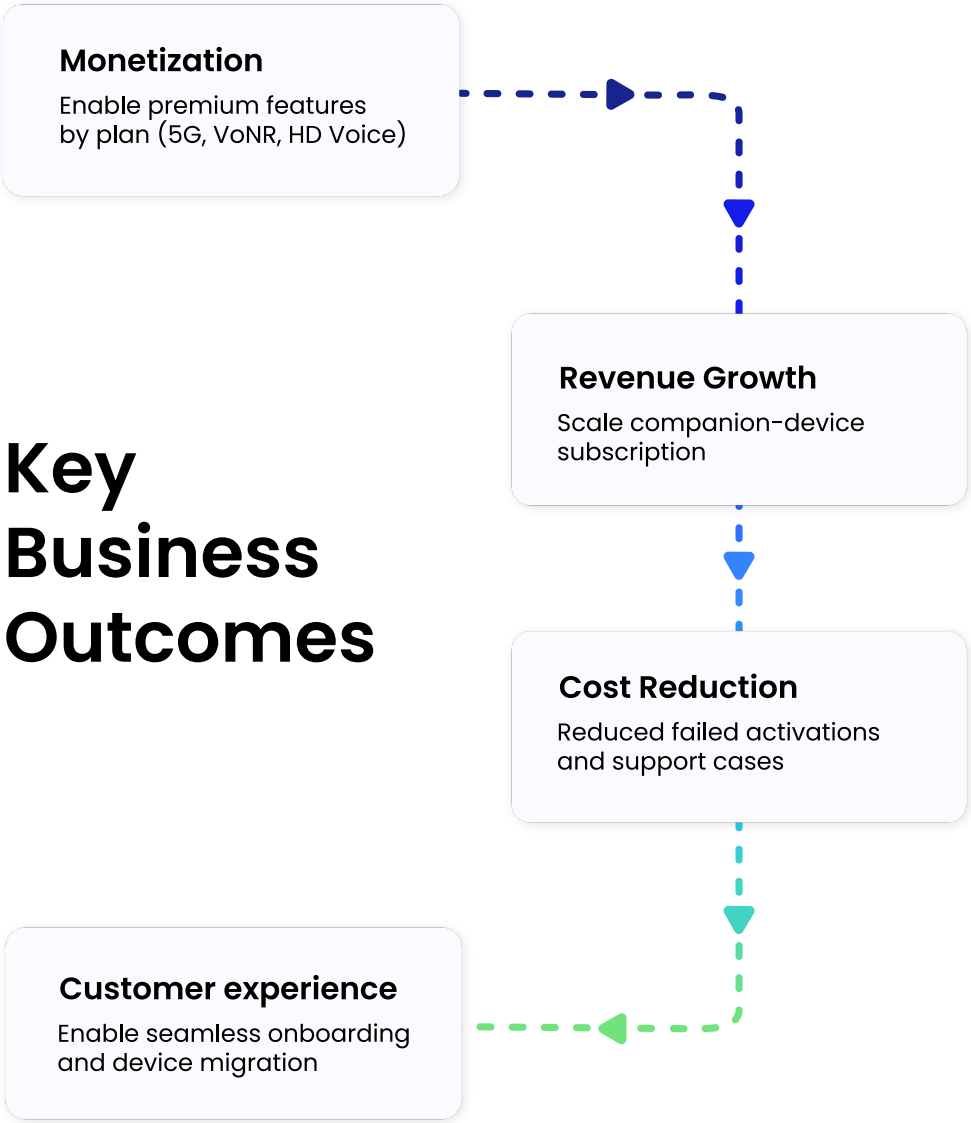
From Authorization to Business Value

DES is not just technical, it is a commercial control point.

Because DES sits at the intersection of device, subscriber, and service logic, it becomes a natural control point for monetization and experience differentiation.

DES transforms connectivity into a **programmable service layer**.

Key Business Outcomes



However, as **activation journeys become more complex** and span multiple systems, delivering these outcomes consistently **requires more than standalone authorization**.

Why DES Alone is Not Enough

Despite its critical role, the Device Entitlement Server does not operate in isolation within modern activation architectures.

While the Device Entitlement Server (DES) is essential for authentication, policy evaluation, and service authorization, operating it as a standalone component introduces structural limitations as eSIM adoption scales:

- **Repeated integrations:** DES must be integrated with multiple channels and systems (apps, OEM flows, BSS, etc), often duplicating logic across use cases, resulting in slower time-to-market and increased complexity.
- **Fragmented ownership:** Activation flows span multiple teams (network, IT, digital, BSS), with no single point of control. This results in operational silos, longer issue resolution and inconsistent experiences.
- **Limited end-to-end visibility:** DES provides decisioning, but not full journey tracking across systems and channels. This limited visibility leads to undetected failures, reduced optimization, and reactive operations.
- **Disconnected Decision & Execution:** DES (decision layer) and SM-DP+ (execution layer) operate independently, without centralized coordination. This can lead to inconsistent flows, complex retries, and poor handling of edge cases.

At Scale, This Becomes Unsustainable

As operators expand across devices, channels, and use cases, standalone DES deployments evolve into fragmented, hard-to-manage architectures.

A new layer is required to coordinate these systems, unify journeys, and enable true end-to-end control.

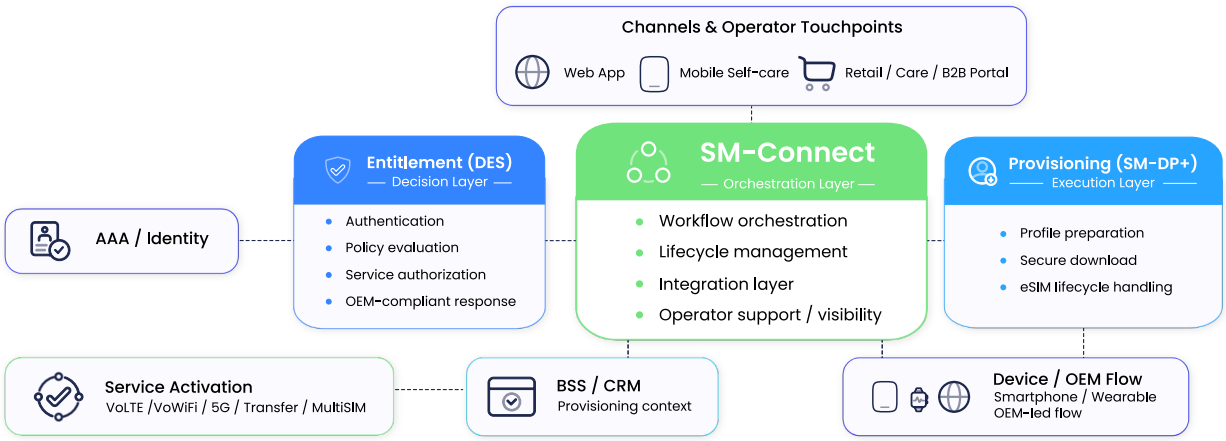


The Orchestration Model

To address these challenges, operators are adopting a new operating model: the orchestration model.

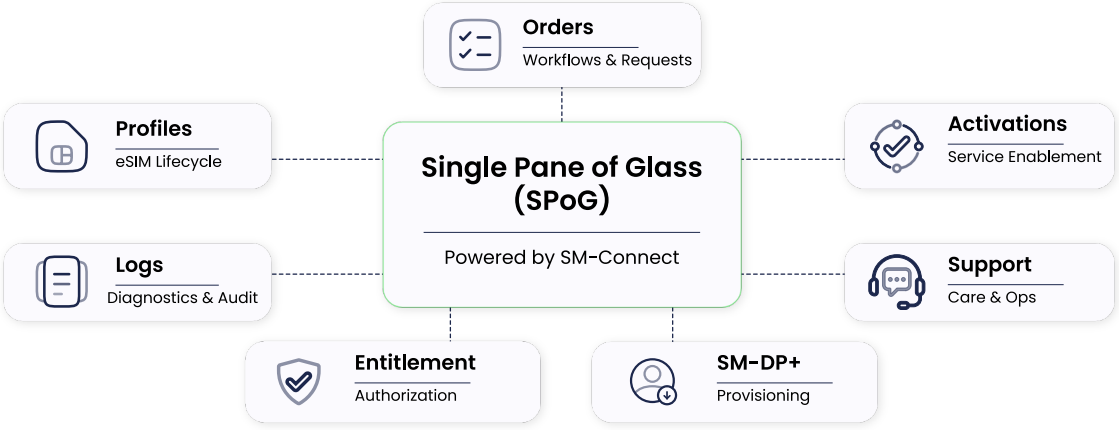
As operators scale eSIM across devices and channels, operational complexity increases significantly. To manage this, orchestration platforms must not only coordinate journeys, but also provide a **unified operational view across all systems involved**.

Orchestrated eSIM Activation Architecture



SM-Connect is the control layer that orchestrates channels, systems and lifecycle flows, while DES governs service decisions and SM-DP+ executes provisioning actions.

These layers represent the core control plane of the eSIM activation process. Valid's orchestration platform (SM-Connect) sits above entitlement and provisioning to coordinate all activation journeys and it enables this through a **Single Pane of Glass** across the eSIM lifecycle, exposing end-to-end visibility and control across onboarding, provisioning, entitlement, and lifecycle management through the **Operator Support Portal**.



A unified operational view across the entire eSIM lifecycle.

Operators are progressively moving towards three operating models

Model 1 — DES Standalone

- Fast to deploy
- Limited scalability

Model 2 — Partial Orchestration

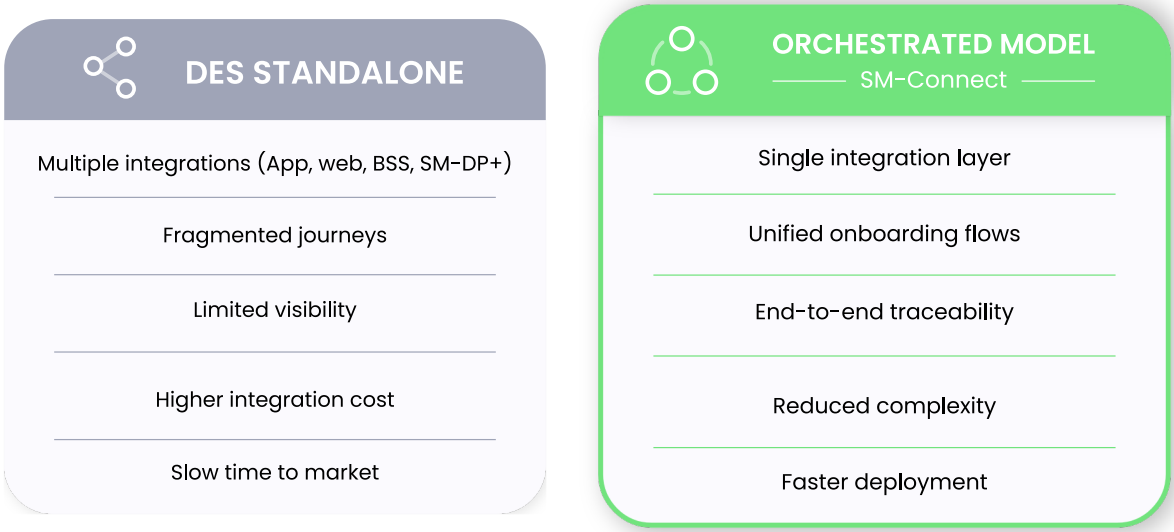
- SM-Connect supports selected journeys
- Reduced complexity

Model 3 — Full Orchestration [Recommended]

- SM-Connect orchestrates DES, SM-DP+, channels
- Single integration layer
- Full lifecycle control

Orchestration is the new operating model.
Operators are moving from components to unified control layers.

While these models can coexist, the difference in operational efficiency, scalability, and time to market becomes increasingly significant as eSIM adoption grows.



From fragmented integrations to a unified control pane.

This shifts the operator model from managing systems to controlling outcomes.

Operational Governance & Observability

At scale, success depends on operations, not just activation.

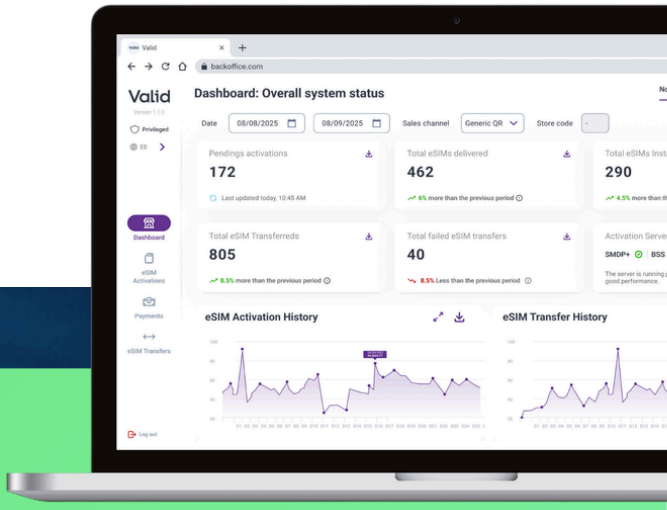
This requires a unified operational model, where all systems, workflows, and lifecycle events can be monitored and managed centrally.

Operators need:

- End-to-end traceability
- Centralized diagnostics
- Policy enforcement
- Auditability

This is where orchestration becomes critical to ROI.

Through Valid's SM-Connect, this Single Pane of Glass is delivered via the **Operator Support Portal**, providing operators with full visibility and control across the eSIM lifecycle.
The Operator Support Portal represents the operational interface of this Single Pane of Glass.





Real-World Impact:
From Fragmentation to Orchestration

A real-world example illustrates the impact of moving from standalone entitlement to orchestration.

A Tier-1 operator with 100M+ subscribers scaling eSIM across channels faced fragmented journeys, duplicated integrations, and limited visibility into activation failures.

By integrating DES within an orchestration layer, the operator achieved:

- **Up to 30% reduction in integration effort**
  Replacing multiple system connections with a single integration model
- **Up to 20% increase in revenue from digital connectivity services**
  Faster activation journeys accelerated adoption of premium and multi-device offerings
- **Up to 40% increase in activation success rates in high-friction scenarios**
  Streamlined service rollout improved reliability across complex journeys

As a result, the operator achieved measurable improvements in operational efficiency, onboarding performance, and service reliability across channels.

Conclusion

The future of eSIM is not defined by provisioning alone, but by the ability to deliver **consistent, scalable, and intelligent digital experiences.**

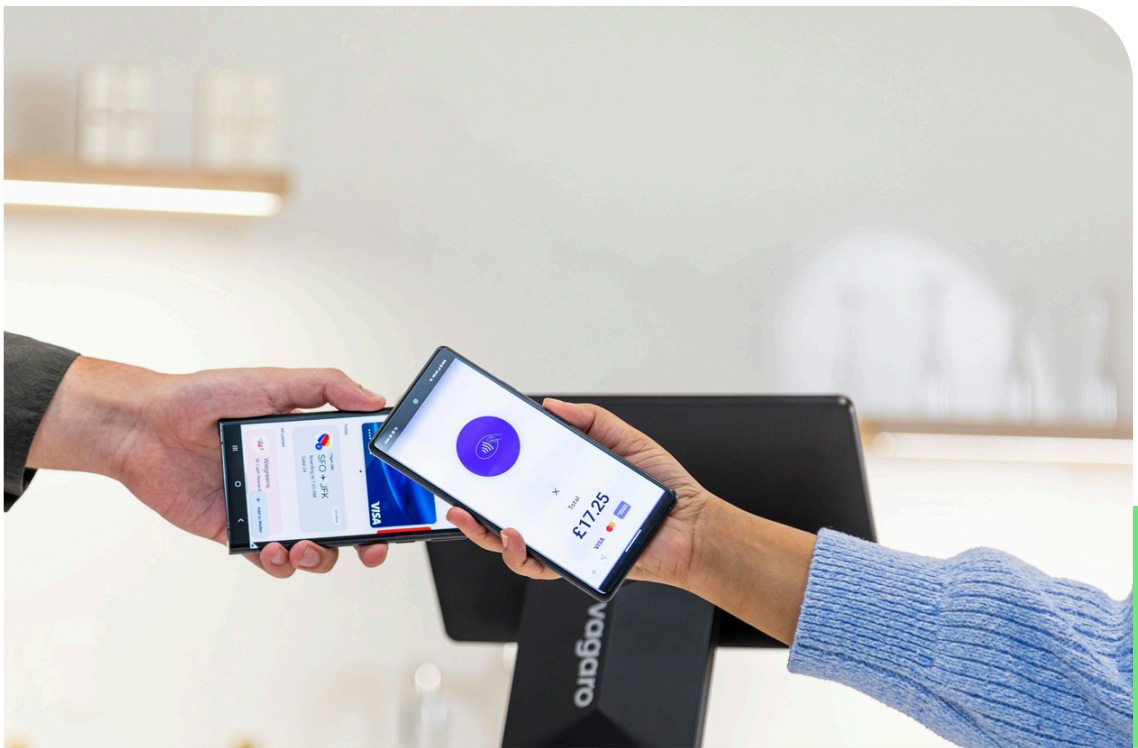
The Device Entitlement Server is an essential component of this transformation, but its **full value is only unlocked within an orchestration model**.

Operators that embrace this model will be best positioned to:

- **Accelerate** time to market
- **Improve** customer experience
- **Scale** across devices and markets
- **Unlock** new revenue opportunities

... or simply scan the QR code!

Click here to book a demo now...



Glossary

1. **AAA(Authentication,Authorization and Accounting):** Network framework responsible for authenticating users, authorizingserviceaccessandtracking usage. In DES contexts, it works with EAP-AKA to validate devices and subscriptions.
2. **BSS (Business Support Systems):** Systems that manage customer data, billing and commercial offers. They provide key inputs for entitlement decisions such as subscription eligibility and service tiers.
3. **Companion Device:** A secondary device (e.g. smartwatch, tablet) linked to a primary subscription. Its activation typically requires validation through DES.
4. **DES (Device Entitlement Server):** A network component that determines whether a device, subscription and service combination is authorized to activate. It acts as the policy and decision layer in entitlement-driven use cases.
5. **EAP-AKA (Extensible Authentication Protocol – Authentication and Key Agreement):** A SIM-based authentication protocol used to securely validate devices against the operator network.
6. **Entitlement:** The process of determining whether a subscriber is authorized to access a specific service on a specific device under defined conditions.
7. **GSMA TS.43:** A GSMA specification defining entitlement mechanisms for services such as VoLTE and VoWiFi.
8. **GSMA SGP.22 / SGP.32**: Standards governing Remote SIM Provisioning (RSP), particularly for consumer and IoT eSIM deployments.
9. **MultiSIM / OneNumber:** A service that allows a single subscription to be used across multiple devices, typically managed through entitlement validation.
10. **MVNO (Mobile Virtual Network Operator):** An operator that provides services using another operator's network infrastructure, often requiring multitenant DES capabilities.
11. **Orchestration Layer:** A control layer that coordinates all components involved in eSIM onboarding (DES, SM-DP+, digital channels, etc.) to deliver an end-to-end experience.
12. **Provisioning:** The process of preparing and securely delivering an eSIM profile to a device, typically managed by the SM-DP+.
13. **QR Code Activation:** A traditional method for activating eSIM by scanning a QR code. Increasingly complemented or replaced by integrated digital onboarding flows.
14. **RSP (Remote SIM Provisioning):** The architecture that enables remote download and lifecycle management of eSIM profiles.
15. **SM-Connect:** An orchestration platform that coordinates DES, SM-DP+, digital channels and lifecycle management to enable unified eSIM onboarding and control.
16. **SM-DP+** (Subscription Manager Data Preparation +): A component responsible for generating, storing and securely delivering eSIM profiles to devices.
17. **Subscriber:** The end user of mobile services whose eligibility and service access are evaluated by the DES.
18. **VoLTE (Voice over LTE):** A voice service delivered over LTE networks, requiring entitlement validation before activation.
19. **VoWiFi (Voice over WiFi):** A voice service delivered over WiFi networks, also dependent on entitlement authorization.
20. **Websheet:** A web-based interface embedded within the device (commonly in OEM ecosystems) used for guided onboarding and activation flows.
21. **5G Entitlement**: The process of validating whether a subscriber is authorized to access 5G services based on device capability, subscription and network conditions.
22. **SPoG (Single Pane of Glass):** Unified operational interface providing visibility and control across the eSIM lifecycle.

References

•GSMA TS.43: Service Entitlement Configuration

•GSMA RCC.14: Service Provider Device Configuration

•GSMA SGP.22: eSIM Consumer Technical Specifications

•GSMA SGP32: eSIM IoT Technical Specification

•EAP-AKA: Extensible Authentication Protocol - Authentication and Key Agreement

Valid

Empowering the Future of Connectivity

LinkedIn
linkedin.com/company/valid-s-a-

YouTube
youtube.com/@Valid_SA

