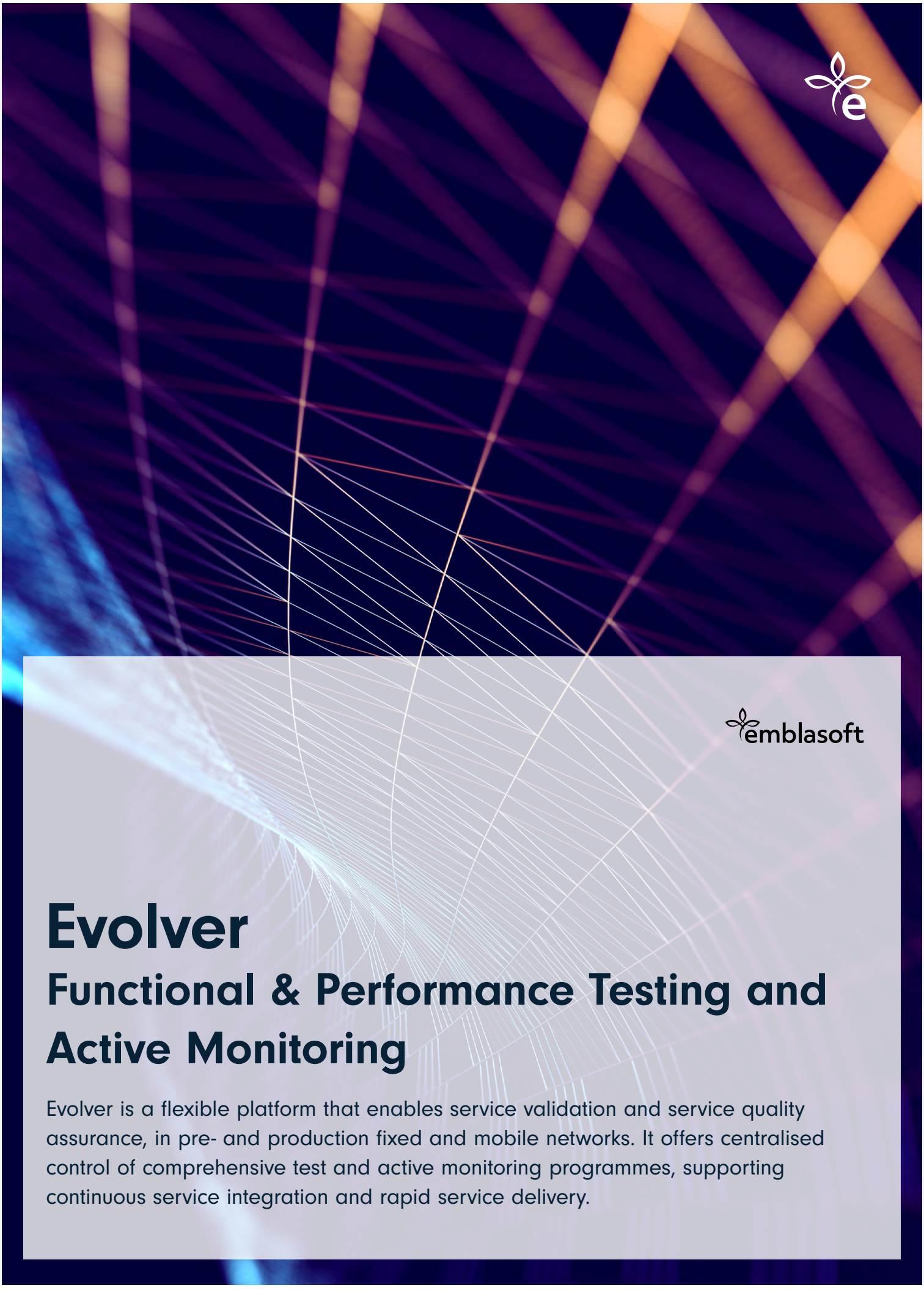

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Evolver

Functional & Performance Testing and Active Monitoring

Evolver is a flexible platform that enables service validation and service quality assurance, in pre- and production fixed and mobile networks. It offers centralised control of comprehensive test and active monitoring programmes, supporting continuous service integration and rapid service delivery.

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About Emblasoft

What we do - Network Testing, Active Monitoring and Service Enablement

We are a global provider of Service Enablement, Active Monitoring, Performance and Functional Test solutions for, 5G, VoLTE, 4G, 3G and IMS infrastructure.

With Emblasoft's solutions, operators and equipment vendors can obtain and deliver new products and services that push the boundaries of technology.

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Evolver

Assuring the complete lifecycle with a single, flexible platform

Evolver is a flexible software-based platform that enables service validation and service quality assurance, in fixed and mobile networks via traffic simulation. It offers centralised control of comprehensive test and active monitoring programmes, supporting continuous service integration and rapid service delivery.

Assuring the complete lifecycle with one flexible platform

Evolver is optimised for the challenges of 5G, 4G and legacy networks, solving the problem of providing full lifecycle assurance, in automated environments, with CI/CD and CT practices.

Evolver enables three key solutions for:

- Functional tests
- Performance tests
- Active monitoring

It provides a central point of control for the smooth delivery of test and active monitoring programmes, backed by distributed software agents that can be independently directed.

Evolver is fully compatible with orchestration platforms, providing alignment with cloud-native deployments and automation, and DevOps delivery models, and ensuring integration with other systems and processes.

Evolver supports a wide range of proven use cases, across different domains and services, for all generations of mobile technology.

It offers connectivity to User and Control Plane interfaces, as well as via REST APIs to external systems. It is provided with a comprehensive, powerful script editor for the configuration of different traffic scenarios, as well as a library of proven scenario templates.

Tests can be fully automated for efficient optimisation.

Key features

- Simplicity and Flexibility for different user profiles
- Increase efficiency, automate hundreds of test cases with Evolver REST API
- High-throughput User Plane Load (RTP and UDP) using XDP, enabling the use of COTS HW
- Reporting and KPIs to suit technical and business needs for assurance validation
- Support SLA-backed 5G / 4G / IMS propositions with variable QoS
- Complete scanrio control with low-level granularity
- Seamless integration with 3rd party systems
- Proactively protect customer experience and reduce churn with dynamic testing
- Import messages from Wireshark to quickly replicate customer issues

Key benefits

- Centralised control, with access for multiple users
- Multi-protocol scripting enabling interworking between any supported protocol
- Comprehensive script editor for configuring advanced traffic scenarios
- Preconfigured library of scenarios
- Extensive and flexible KPI reporting and real time alarms
- Full export of reports and statistics to Prometheus / Grafana or other 3rd Party Analytics tool
- Scalability to hundreds of active agents for active monitoring
- Orchestration, automation, and cloud-native deployment
- Encrypted traffic capabilities

Figure 1:
Example of Grafana dashboard: 5G slice monitor

Functional Testing – quality control throughout the service lifecycle

Evolver supports comprehensive Functional Testing programmes, aligned with agile DevOps processes.

With REST API integration to orchestration and other platforms, full automation is enabled, covering asynchronous testing for multiple pipelines.

Functional testing drives continuous quality assurance for new services and updates to functional entities and nodes, step-by-step.

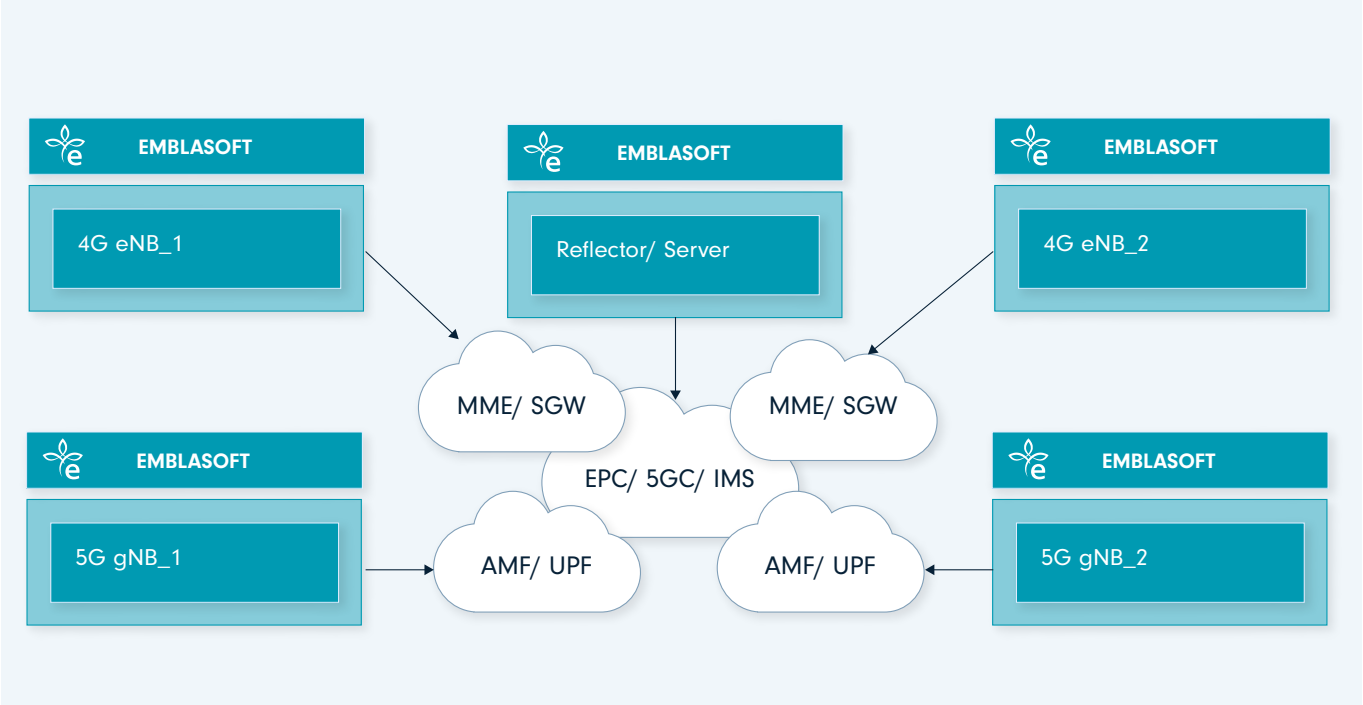
It enables you to detect and resolve faults before they are introduced to the network, protecting subscriber experience and ensuring consistent performance, reducing OPEX costs.

Performance Testing – extreme traffic load for scaling services

Evaluating service performance means testing with increasing load to determine impact on quality as demand scales. Evolver's Uranium XDP module delivers cost-effective, high-throughput data generation – enabling low latency measurements for any data plane application, such as extreme high-load 5G E2E and user plane verification.

The Uranium module enables end-to-end 5G testing over multiple different network slices, and is able to handle the extreme and variable load you need to ensure consistent performance as consumption surges.

Figure 2:
Example of where Evolver could sit in the customer network



Active monitoring with real traffic sessions

As well as functional and performance testing, Evolver also supports Active Monitoring through the deployment of software agents, controlled from a central control platform.

The agents can be installed – dynamically, on-demand – in any network domain to generate real traffic sessions and measure QoS for differentiated services and applications.

They enable efficient, cost-effective assurance of live services, providing a scalable means of validating active traffic flows, for specific services and with close control over highly granular scenarios.

Evolver offers the ability to support multiple protocols and interfaces from the same platform, simultaneously. Covering current and legacy interfaces, this enables the complete service flow to be explored, end-to-end, for complex, multi-generation networks.

Multi-protocol – on the same platform and traffic flows

Evolver offers the ability to support multiple protocols and interfaces from the same platform, simultaneously. Covering current and legacy interfaces, this enables the complete service flow to be explored, end-to-end, for complex, multi-generation networks.

Protocols and interfaces can be mixed within the same traffic – and billing can be verified to support revenue assurance. Containerised software means that Evolver can operate in isolation with any Network Resource Function, in cloud-native environments.

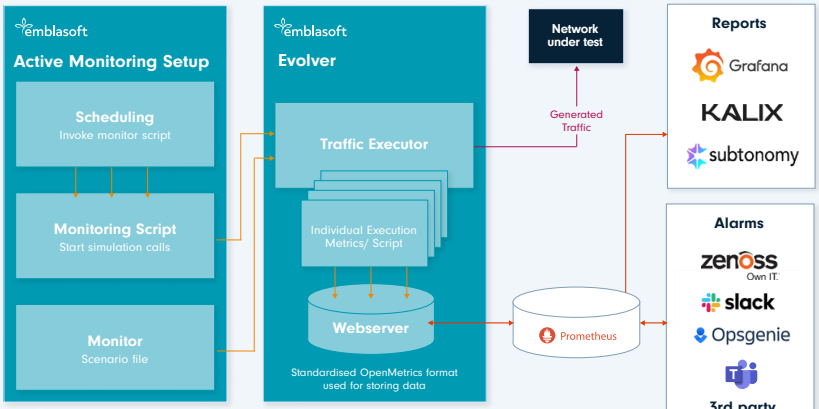
Open integration – choose the tools you need

REST APIs enable open integration with different orchestration, visualisation and automation frameworks, allowing you to seamlessly bring Evolver into your chosen solution set.

Interoperate with Prometheus, Grafana, OpenShift, Jenkins, and many more.

This enables full control of test programmes – covering activation, result collection, as well as the ability to change parameters that matter to individual users. This provides flexibility of choice for the automation engine, ensuring compatibility with your environment, protecting investments.

Figure 3:
Emblasoft Active Monitoring Architecture and Integration



Web GUI – skills-based usage and access

Evolver's Web GUI enables users with different skillsets to easily access the powerful test, validation and active monitoring capabilities.

It supports multiple sessions and full automation, allowing for efficiency across planned and ad hoc programmes.

The GUI offers pre-written configurations and scripts, while also supporting the creation of complex scenarios for custom testing by experienced users.

Evolver can be made available to more stakeholders, maximising return on investment and supporting agile CT organisations.

Test and validation for:

- Multi-Terabit UDP Traffic for 5G UPF in isolation
- 4G / 5G Core Network Functions in isolation
- 5G Slicing / QFI
- 4G / 5G end-to-end application traffic
- PTT and MCx application verification
- VoLTE / VoNR / VoWiFi / SIP with MOS scoring
- High volume RTP traffic
- Roaming security verification
- SS7 performance and validation
- Messaging SMS/RCS/RBM

Specifications

- **5G Core Testing Support:**
  - E2E with Data, Voice, Messaging or Streaming
  - Nodes in Isolation
    - AMF, SMF, UPF, CHF, PCF, NEF, NRF, NSSF, SEPP, etc.
  - QoS: Slicing and QFI
- **4G Core Testing Support:**
  - E2E with Data, Voice, Messaging or Streaming
  - Nodes in Isolation: MME, SGW, PGW, HSS, PCRF, OCS, etc.
  - QoS
- **Wifi Offloading:**
  - Data, Voice and Messaging or Streaming
- **Mobile Core Protocol and Interface Testing**
  - **SS7**
    - Protocols: ANSI, ITU, M3UA, SCCP, ISUP, MAP, CAP , INAP
    - Nodes in Isolation: STP, HLR, OCS, SMSC, etc.
  - **Diameter**
    - Protocols: Rf, Rx, Gx, Gy, Zh, Zx, SWx, SWm/S6b, S6a/ S6d, Sh, Sd
    - Nodes in Isolation: DRA, HSS, OCS, PCRF, etc.
  - **5G-SBI**
    - Protocols: N8, N10, N11, N12, N16, N21, N24, N27, N32-c, N32-f
    - Nodes in Isolation: UDM, CHF, SEPP, BSF, SCP, etc.
- **Application Layer Traffic**
  - **Data**
    - UDP, TCP, HTTP, HTTP2, FTP SMTP, IMAP, DNS, MSRP
  - **Streaming**
    - HTTP Streaming, RTSP, RTMP, etc.
  - **IMS/ Voice Client/Server**
    - SIP, MSRP, XCAP, ENUM, RTP, SRTP, TLS, IPSec
    - Codecs: EVS, AMR.WB, AMR-NB, G.711, G.722, G.729, H.264
    - VoiceQuality: PESQ, POLQA, Jitter, Delay, Dropped Packets
- **Messaging**
  - Types: SMSoIP, SMPP, SMSoMAP, RCS, RBM, SMSoSGd, MMS
  - Nodes in Isolation: RCS Server, IPSMGW, SMSC
- **Roaming**
  - SS7: SS7 FW, SMS FW, STP
  - Diameter: Diameter FW, DRA
  - 5G: SEPP, SCP, BSF
  - S8 Homebound Roaming
  - N9 Homebound Roaming

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