



Open Source Telecom Signaling

PAiCore USSD Gw & USSI

Reigniting telecom innovation and sustainable profitability via open source signaling solutions



USSD Gw & USSI

Ubiquitous, Interactive & Secure Messaging

PAiCore's Unstructured Supplementary Service Data (USSD) Gateway powers **interactive, menu-based, secure messaging**. Each USSD interaction is session-based and **leaves no trace on the phone**, which makes it ideal for high impact applications such as mobile banking, micro-insurance, customer self-care access and national emergency services.

By implementing the USSI standard (USSD over the IMS as per 3GPP TS 24.390), the gateway acts as a unified signaling bridge that enables legacy USSD services to operate over 4G and 5G networks. This architecture performs a transparent translation between traditional SS7/MAP environments and the IMS core. Signaling with IMS Core Network nodes such as the S-CSCF over SIP and the HSS via either SS7 MAP or Diameter Sh, ensures service continuity and interoperability throughout the network's evolution.

PAiCore's SDP (Service Delivery Platform) is deployed together with our USSD Gw & USSI to provide an API layer that allows businesses to integrate their existing business flows and applications directly with a USSD menu. The SDP offers a user-friendly Service Creation Environment (SCE) which **reduces time to market of USSD services** from several hours or even days, to only a few minutes.

As an **open source solution**, it offers operators a fully owned platform with security and control, able to access telecom networks via SS7/SIGTRAN, Diameter, SIP, SMPP or HTTP.

Key Features



A no-code GUI enables rapid service creation & immediate go-live



API access via SDP allows for rich business logic delivery

SS7

Advanced HTTP-SS7 capabilities power high transaction use cases



Multi-protocol options, including Diameter and SIP for 4G LTE & 5G

Recent Success Stories



Elisa uses the **PAiCore USSD Gw & USSI** to provide direct customer top-ups & deliver Value-Added Services (VAS) to corporate clients via interactive USSD applications.



Claro Colombia (via fonYou) uses **PAiCore's USSD Gw & USSI** to offer zero-balance services, letting subscribers top-up & purchase products even when being out of airtime balance.

USSD Gw & USSI



Multiple Commercial Options

The free Basic Version, publicly available as open source, fosters continuous innovation. PAiCore also offers PT Bundles for professional services, and CT Editions available through OPEX plans with 24/7 technical support and usage rights, or CAPEX models that provide ownership of enhanced, carrier-grade CT products.



No-Code Service Creation Environment

Together with the Service Delivery Platform (SDP), our USSD Gw offers an easy to access no-code Service Creation Environment (SCE). This gives our customers a friendly GUI to create and edit USSD menus, expediting time-to-market.



User Segmentation Capabilities

Our no-code SCE empowers users to effortlessly configure dynamic USSD menus, leveraging real-time variables to allow tailored menu options depending on user profiles, thus enabling a targeted and personalized user experience.



Multi-Protocol Capabilities

Its multi-protocol capabilities (SS7/SIGTRAN, Diameter, SMPP, HTTP, SIP) enable easy integrations with MVNOs and MNOs, making it compatible with legacy and next generation networks, including preparing it to deliver USSD over SIP (USSI).



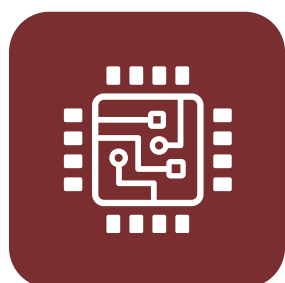
Multi-Tenant Capabilities

Our USSD Gw offers the versatility to connect and support multiple MNOs / MVNOs core networks. It directs traffic based on the host network of mobile users accessing USSD shortcodes, ensuring efficient and reliable service delivery across diverse network environments.



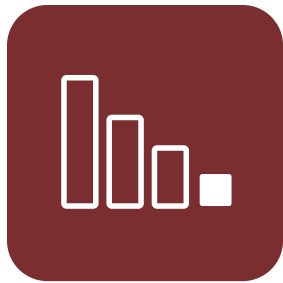
Integration With External Ecosystems

The USSD Gw is compatible with SIP, HTTP, and third-party APIs, providing robust support for reliable integration with existing systems and services.



Integration With Emerging Technologies

Solid foundation for integration with innovative technologies such as social media messaging and AI solutions like ChatGPT, enabling creative use cases over an extremely secure telecommunications channel.



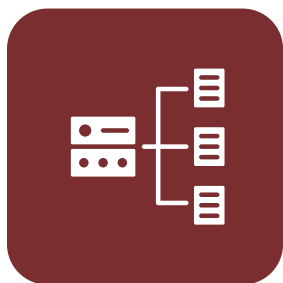
Broader Accessibility Without Internet Dependency

The USSD Gw provides accessibility to a wider customer base, as it operates independently of internet connectivity. This makes it an excellent addition to marketing and customer care strategies, ensuring reach even in areas with limited or no internet access.



Network Initiated USSD | Push USSD

Push USSD is a feature that enables businesses to proactively send interactive messages to users devices, allowing immediate access to services without requiring a prior request. It is ideal for use cases such as digital marketing and customer surveys.



Load Balancing and High Availability

By efficiently distributing traffic across multiple servers and providing failover mechanisms, our USSD Gw delivers reliable performance and supports continuous operations even during peak loads or server failures.



Advanced Telco Capabilities – Balance Plus Support

Our USSD Gw supports advanced use cases like Balance Plus, enabling detailed balance queries including core credit, data usage, expiration dates, and personalized package offers. The operation leverages MAP-USSD signaling via STP, interfacing with key network elements such as the HLR for subscriber validation and the OCS for real-time balance retrieval.



IMS & SS7 Signaling Interworking

Unified signaling bridge that interconnects legacy SS7/MAP networks with the IMS core. The platform is designed to handle the full complexity of both Mobile-Originated (MO) and Network-Initiated (NI) pull/push operations.



Stateful Session Orchestration

Guarantees end-to-end session integrity by synchronizing TCAP primitives (Begin, Continue, End) with SIP methods (INVITE, INFO, BYE) in real-time.



3GPP-Compliant USSI Signaling (TS 24.390)

Ensures full architectural alignment with 3GPP TS 24.390 standard for USSD over IMS. The platform provides verified signaling procedures for both Mobile-Initiated and Network-Initiated sessions, utilizing SIP INVITE and INFO methods to transport standardized XML payloads.

PAiCore Technology USSD Gw & USSI Versions

Feature	Free Basic Version	Technical Support Plans
Base USSD Flows		
Mobile-Originated USSD Session Pull USSD	✓	✓
Network-Initiated USSD Session/Notification Push USSD	✓	✓
USSD Dialog Management (Session Continuity)	✓	✓
Forwarding USSD Requests to External Applications	✓	✓
USSD Response Handling (Response Flow)	✓	✓
Error Handling and Notifications	✓	✓
Session Termination	✓	✓
Service Creation Environment	✓	✓
Protocols		
SS7	✓	✓
SIP	✓	✓
Diameter	✓	✓
HTTP	✓	✓
SMPP	-	✓
CUAP	-	✓
Integrations		
Social media messaging	-	✓
AI, including ChatGPT	-	✓
Service Delivery Platform integration	-	✓
Reliability		
Load balancing	-	✓
High availability	-	✓
USSI (USSD over IMS – 3GPP TS 24.390)	-	✓
Support for Balance Plus	-	✓



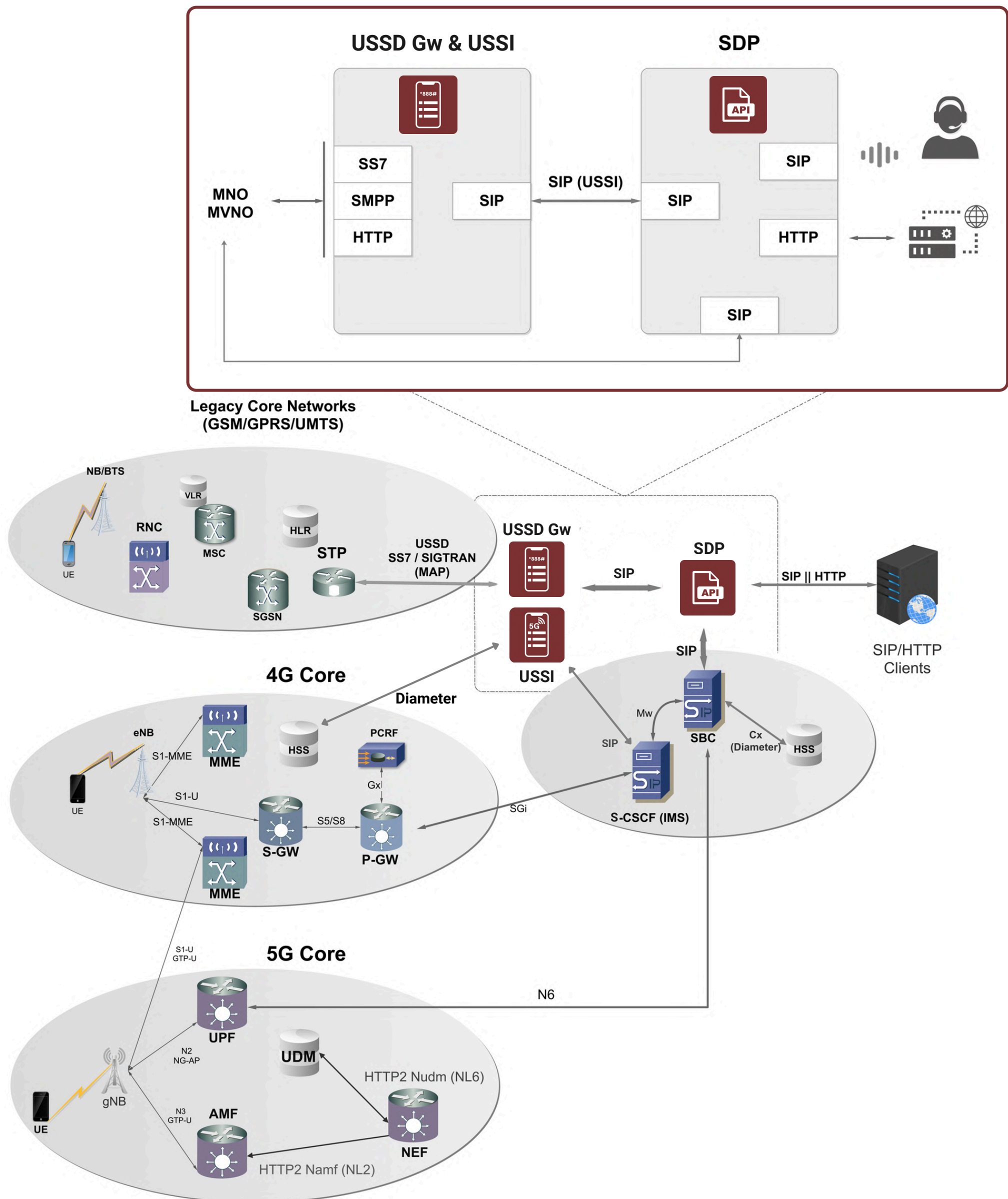


Open Source Telecom Signaling

Appendix – Technical Information



Architecture



No-code Service Creation Environment (SCE)

PAiCore
TECHNOLOGY

Language

USSD Message

USSD Collect

Control

External Service

Log

USSD Demo with Currency Converter

ModulesStartup module - Capture optionSave

Capture optionWelcomeRatesMyNumberExitUSD EUREUR USDEXchange USD EURExchange APIValidate optionInvalid option

Capture destinationSMSCapture message

123 characters left

USSD Collect

ED USSD Message

Welcome to demo:

1. My number

2. Rates

3. Send SMS

4. Exit

59 occupied

MenuCollect reply

Assign reply tomenuScopeapplicationContinue toValidate option

PAiCore
TECHNOLOGY

Language

USSD Message

USSD Collect

Control

External Service

Log

USSD Demo with Currency Converter

ModulesStartup module - Capture optionSave

Capture optionWelcomeRatesMyNumberExitUSD EUREUR USDEXchange USD EURExchange APIValidate optionInvalid option

Capture destinationSMSCapture message

139 characters left

external service

Service Urlhttp://api.currencylayer.com/live

Url parameters

Nameaccess_keyValue63cc2f461e340959360d7472f94ff1ca

NamecurrenciesValueEUR

NameformatValue1

NamesourceValueUSD

Add service parameterAdd http header

Assign response to variables

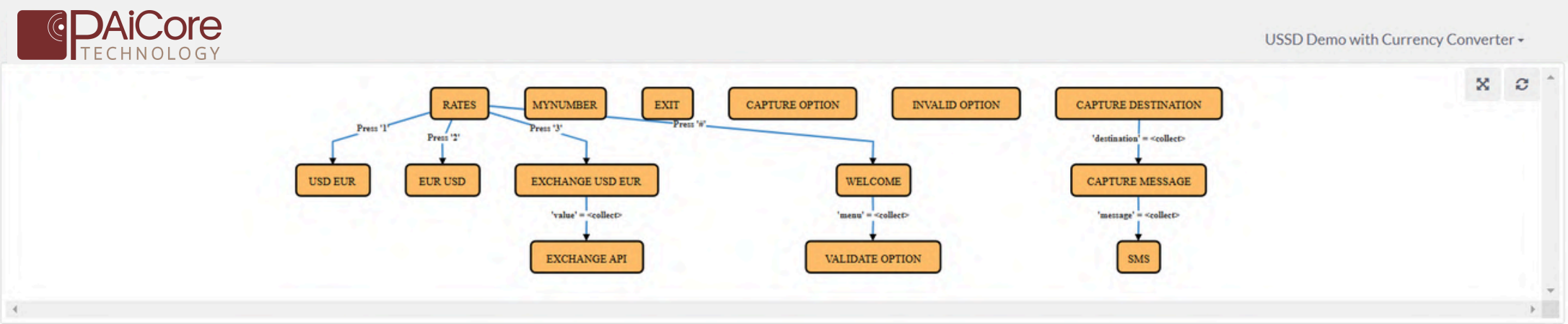
Add assignment

Assign torateScopeapplication

Module scope-- All --

Make a routing decision

Continue to



Connectivity Requirements

TPS & Recommended HW

TPS Range	RAM	Core	Disk	Network	Sample AWS Instance
Up to 200 TPS	8 GB	2	100 GB SSD	1Gbps	m5.large
Up to 1,200 TPS	16 GB	4	200 GB SSD	1Gbps	m5.2xlarge

Note: Our software products are fully tested and optimized for deployment in AWS EC2 instances, ensuring peak performance and reliability. While they are compatible with any Linux-based virtual environment, performance may vary depending on the underlying infrastructure and configuration.

For the following interconnection tables, the displayed values must be taken as examples.

For SIP interconnection

No	Description	Value	Comments
1	SIP Proxy IP	1.1.1.1	IP address of the SIP proxy.
2	SIP Proxy Port	5060	Port number of the SIP proxy.
3	Username	sip_user	Username for SIP authentication.
4	Password	*****	Password for SIP authentication.
5	Domain	sip.customer.com	SIP domain for user registration and authentication.

For SMPP interconnection

No	Description	Value	Comments
1	System ID	smpp_ account_1	Identifies the ESME system requesting to bind with the USSD Gw & USSI.
2	Password	*****	The password used by the USSD Gw & USSI to authenticate the ESME requesting to bind.
3	Server(s) IP	1.1.1.1	The USSD Gw & USSI IP address(es) over where the ESME(s) will bind to connect.
4	Server(s) Port	2776	The USSD Gw & USSI port number(s) over where the ESME(s) will bind to connect.
5	Peer(s) IP	2.2.2.2	The peer(s) IP address(es) from the ESME(s).
6	Peer(s) Port	2775	The peer(s) port number(s) from the ESME(s) (optional).

For HTTP/1.1 and HTTP/2 integrations

No	Comments
1	The required API documentation is available.



For SIGTRAN (SCTP/M3UA) interconnection

Description	Value	Comments
IP and Port at peer side	1.1.1.1	Peer (usually SGW) SCTP endpoint IP address(es) and port number list.
IP and Port at host	2.2.2.2	Host (usually AS) SCTP endpoint IP address(es) and port number list.
SCTP mode	peer	Side that shall initiate the SCTP association and act as client: Host or Peer?
M3UA type	AS	Process that shall run on the platform host at M3UA: AS or SGW or IPSP?
Routing Context	12345	The Routing Context assigned to the platform identifying its MTP3 routing key.
Network Appearance	3	Identifier of the SS7 network context for the routing key. Not required if SGW operates in the context of a single SS7 network, or if individual SCTP associations are dedicated to each SS7 network context.
Traffic mode	Override	Traffic mode type: Override or Loadshare. Override: ASP takes over all traffic overriding any currently active ASPs in the AS. Loadshare: the ASP will share in the traffic distribution with any other currently active ASPs.
Message Exchange	SE	IPSP model defining if each exchange of ASPTM or ASPSM messages can be initiated by either IPSP (Double Exchange, DE) or not (Single Exchange). SE if unknown.
MUA ASP ID	1	Optional ASP ID (provide it only if it has been set by the operator).

For Diameter interconnection

No	Description	Value	Comments
1	Host IP	1.1.1.1	Diameter IP address(es) assigned to the PAiCore Technology platform (SMSC, GMLC, DRA, etc.).
2	Host Port	3868	Diameter port number(s) assigned to the PAiCore Technology platform (SMSC, GMLC, DRA, etc.).
3	Host Realm	epc.mcc748.mnc012.3gppnetwork.org	The string(s) in the Network Access Identifier (NAI) that immediately follows the "@" character assigned to the PAiCore Technology platform (SMSC, GMLC, DRA, etc.).
4	Host User Name	host_name.epc.mc748.mnc012.3gppnetwork.org	The string(s) which contains the User-Name in a format consistent with the NAI specification assigned to the PAiCore Technology platform (SMSC, GMLC, DRA, etc.).
5	Host Number	861684684	ISDN (E.164) number assigned to the PAiCore Technology platform (SMSC, GMLC, DRA, etc.).
6	Peer IP(s)	2.2.2.2	Diameter IP address(es) of the peer side (DSC or DRA or DEA or IWF).
7	Peer Port(s)	3869	Diameter port number(s) of the peer side (DSC or DRA or DEA or IWF).
8	Peer Port Range	3868-3869	Port range to use for establishing SCTP associations.
9	Peer Realm	epc.mcc748.mnc01.3gppnetwork.org	The string in the DSC/DRA/DEA/IWF Network Access Identifier (NAI) that immediately follows the "@" character.
10	Peer User Name	peer_name.epc.mc748.mnc01.3gppnetwork.org	The string which contains the DSC/DRA/DEA/IWF User-Name in a format consistent with the NAI specification.