GSMA Working Groups LinkedIn Live

IR.21: Advancing Interoperability in roaming

GSMA

GSMA Working Groups

Scan to learn more about GSMA Working groups

Scan the QR code or email workinggroups@gsma.com for more information

GSMA

GSMA

Five reasons you should join GSMA Membership

Discover how we can transform your business

Agenda

Today's LinkedIn Live session will cover:

- **IR.21 New Release and Implementation**
- **Advancing Interoperability in roaming**

Q&A

Please share your questions in the chat.

Olu Oke

Standardisation Working Group Director
GSMA

Fabrizio Fiorucci

Roaming Engineer
TIM

Javier Sendin

Technical Director
GSMA

Olu Oke

Standardisation Working Group Director

GSMA

IR.21 New Release and Implementation

New Features of IR.21/RAEX

What is IR.21? Why is it needed?

- IR.21 is a document designed to contain all needed Network information for exchange among Companies, in order to support Roaming and Interworking services. IR.21 v18 was recently published.
- Operators can choose who to make their data available to (e.g. full data may be provided to a Roaming Partner whilst partial data may be provided to Non-Roaming Partners).
- GSMA has developed a Tool called **R**oaming **A**greements **EX**change (**RAEX**) to exchange this information in a secure environment.
- A New Release of RAEX is expected at the end of March 2026, with its UAT to hold between **23/2 and 08/3/2026**. This webinar will highlight additional features expected in this version.
  - Companies interested in taking part in the UAT should contact ooke@gsma.com and jsendin@gsma.com.

Networks Group

IR.21/RAEX: Categories of Changes made

Changes Due to the New RAEX IR.21 Schema

Roaming Gateway Usability Improvements

Change Due to New Operational Data Requirements

Changes were made based on member input

Changes due to the New RAEX IR.21 Schema

Examples of New RAEX IR.21 Schema Changes:

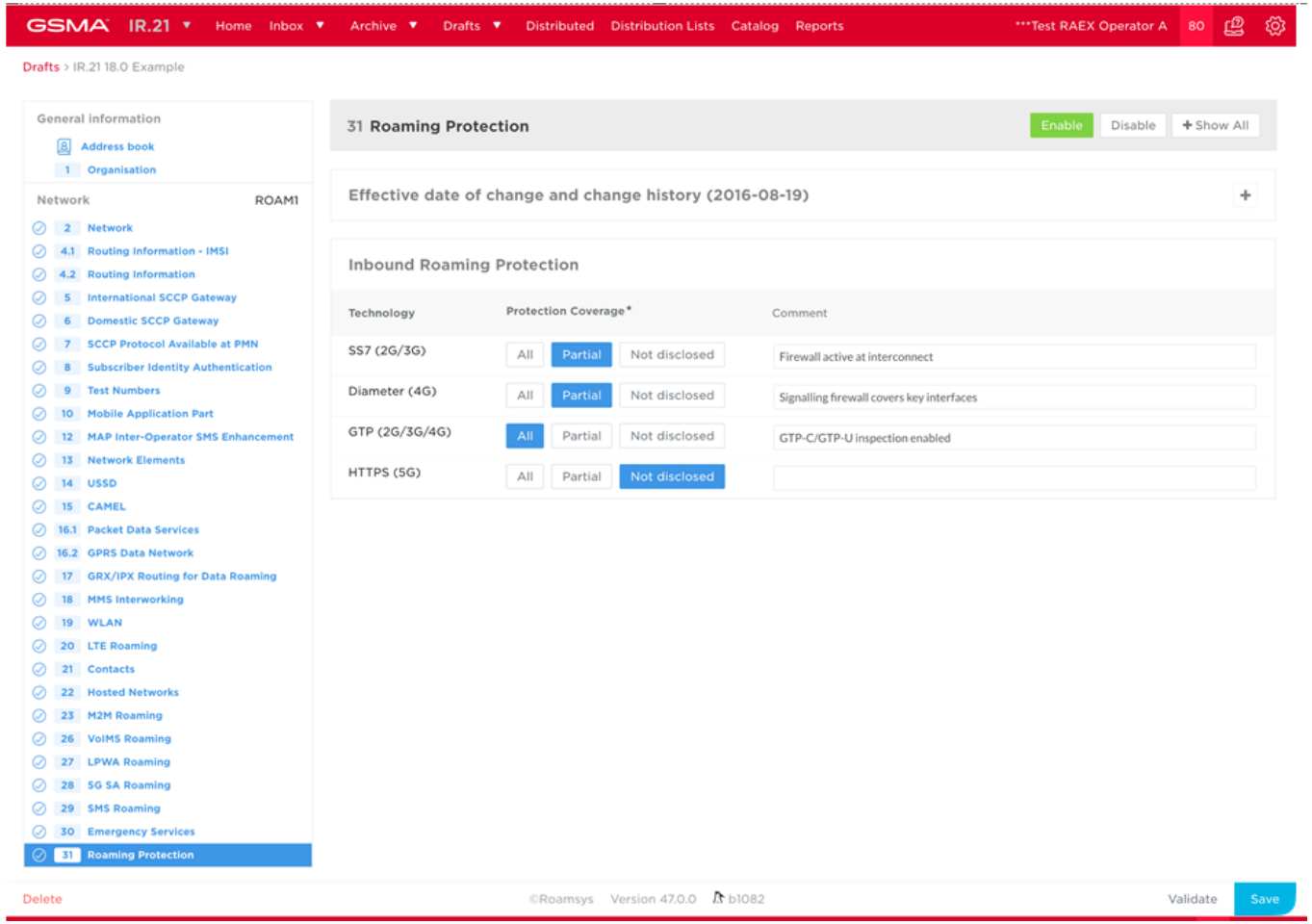
- Add Roaming Protection Section
- Improve Support for Satellite Operators
- New Section for Emergency Services
- Rename SMS Interworking and Introduce Network Type checks
- Contacts section improvement
- Additional Emergency Call Configurations and New Report

1) Add Roaming Protection Section

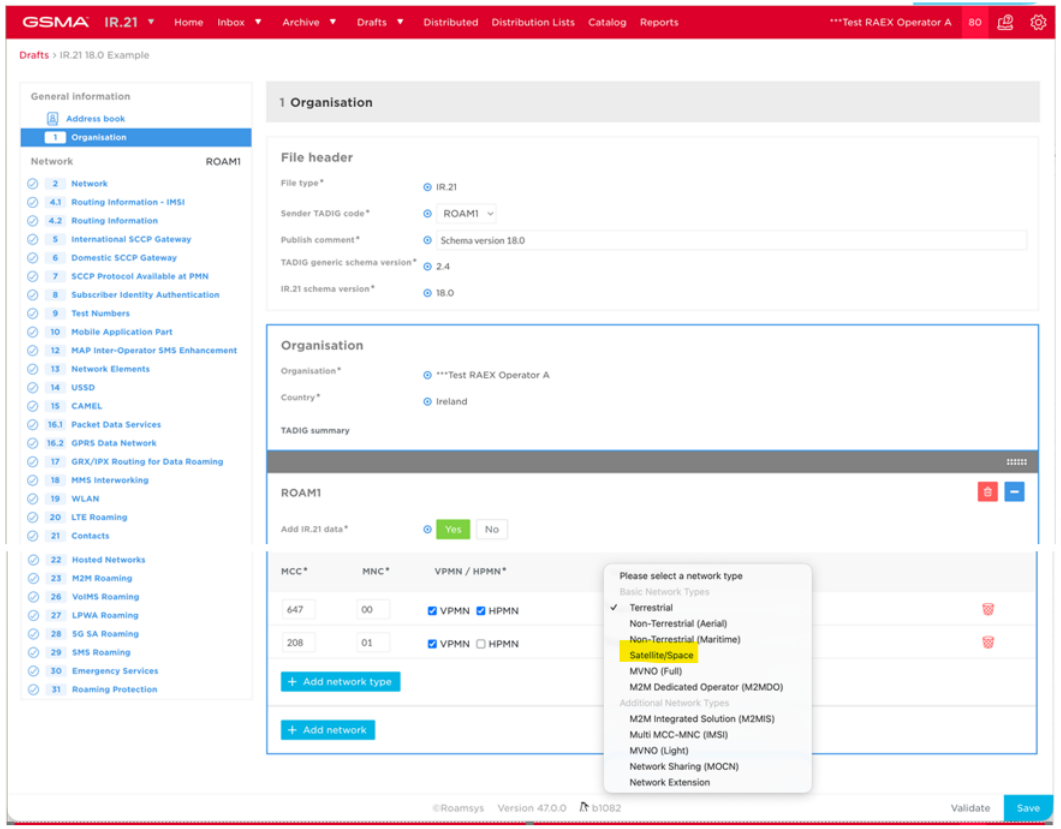
Section 31 (Roaming Protection)

- New optional “Roaming Protection” section
- Single subsection “Inbound Roaming Protection”
  - Technology (SS7, Diameter, GTP, HTTPS)
  - Protection Coverage (All, Partial, Not disclosed)
  - Comment (Optional)

Impact: User interface, RAEX format, PDF representation, import/export



2) Improve Support for Satellite Operators



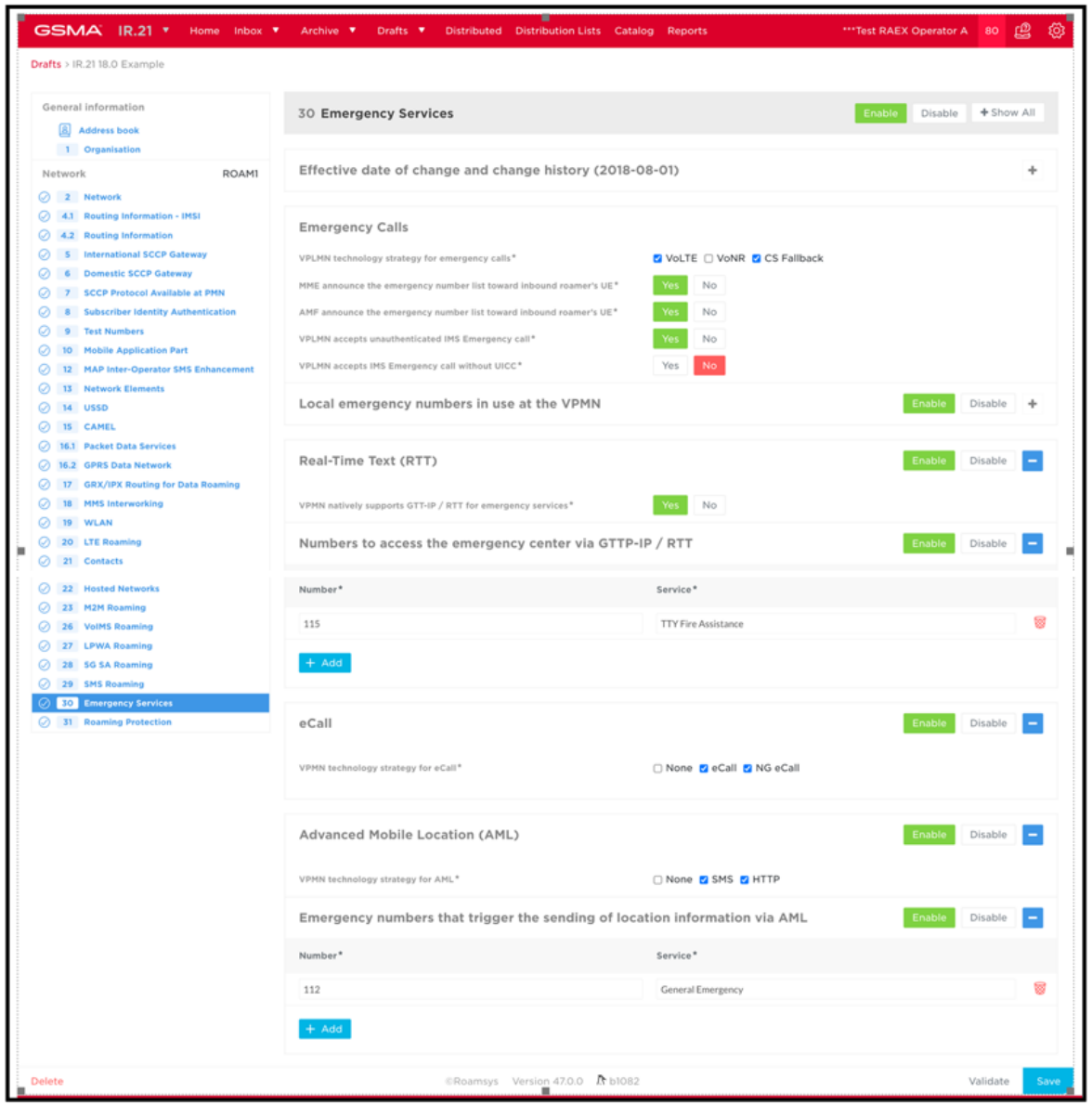
Change Improves support for NTN (*Non-Terrestrial Networks*) and inbound-only roaming operators

- **Section 1 (Organisation)**
  - Add new **network type** “Satellite/Space” to TADIG summary
- **Section 2 (Network)**
  - Add new **coverage** option “Global” for all frequencies

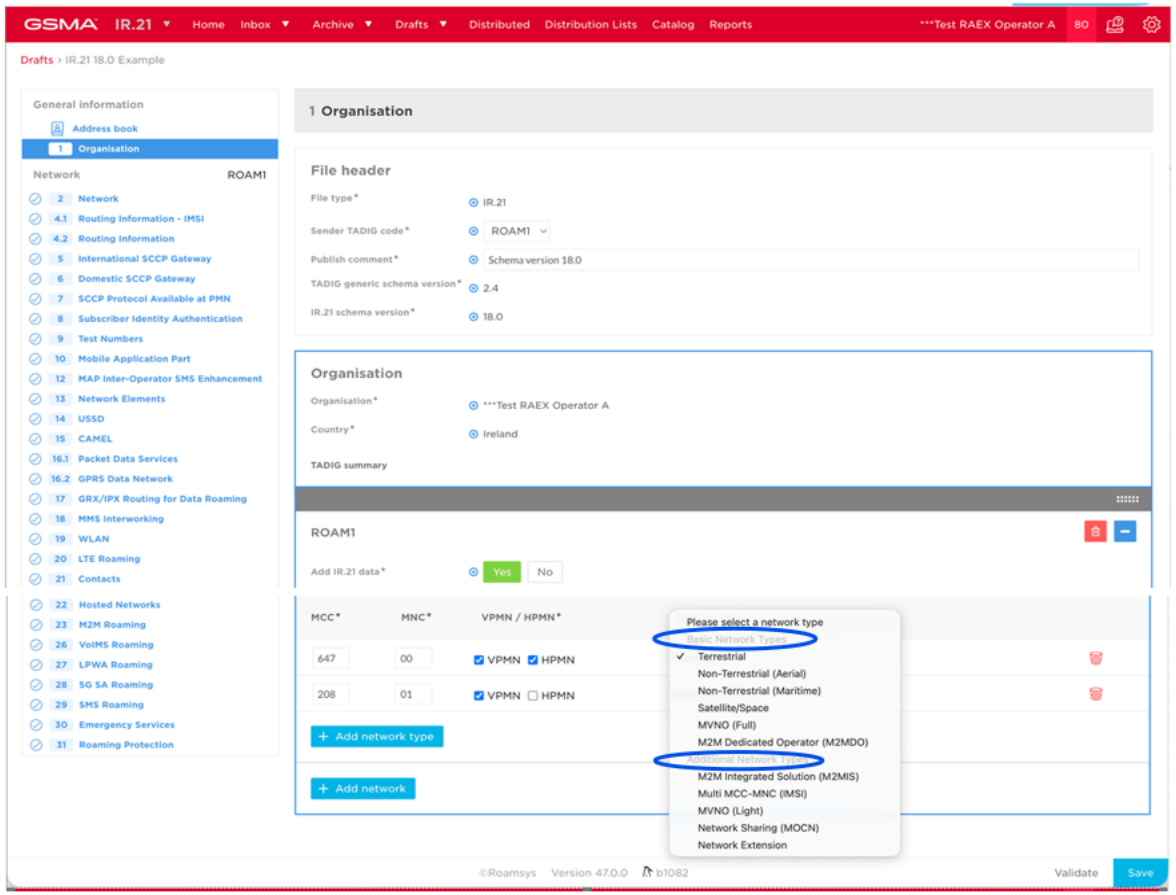
Impact: RAEX format, import/export

3) New Section for Emergency Services

- Emergency Services information shall be moved from section **26 VoIMS Roaming** to a new section **30 Emergency Services.**
- The new section shall be non-confidential, i.e. its data cannot be hidden from the IR.21 catalog and reports.
- The new section shall contain the complete Emergency Calls subsection from section 26 VoIMS Roaming.
- The confidentiality of this information is updated to support the provision of essential services that aid non-GSMA members in the delivery of Emergency services.

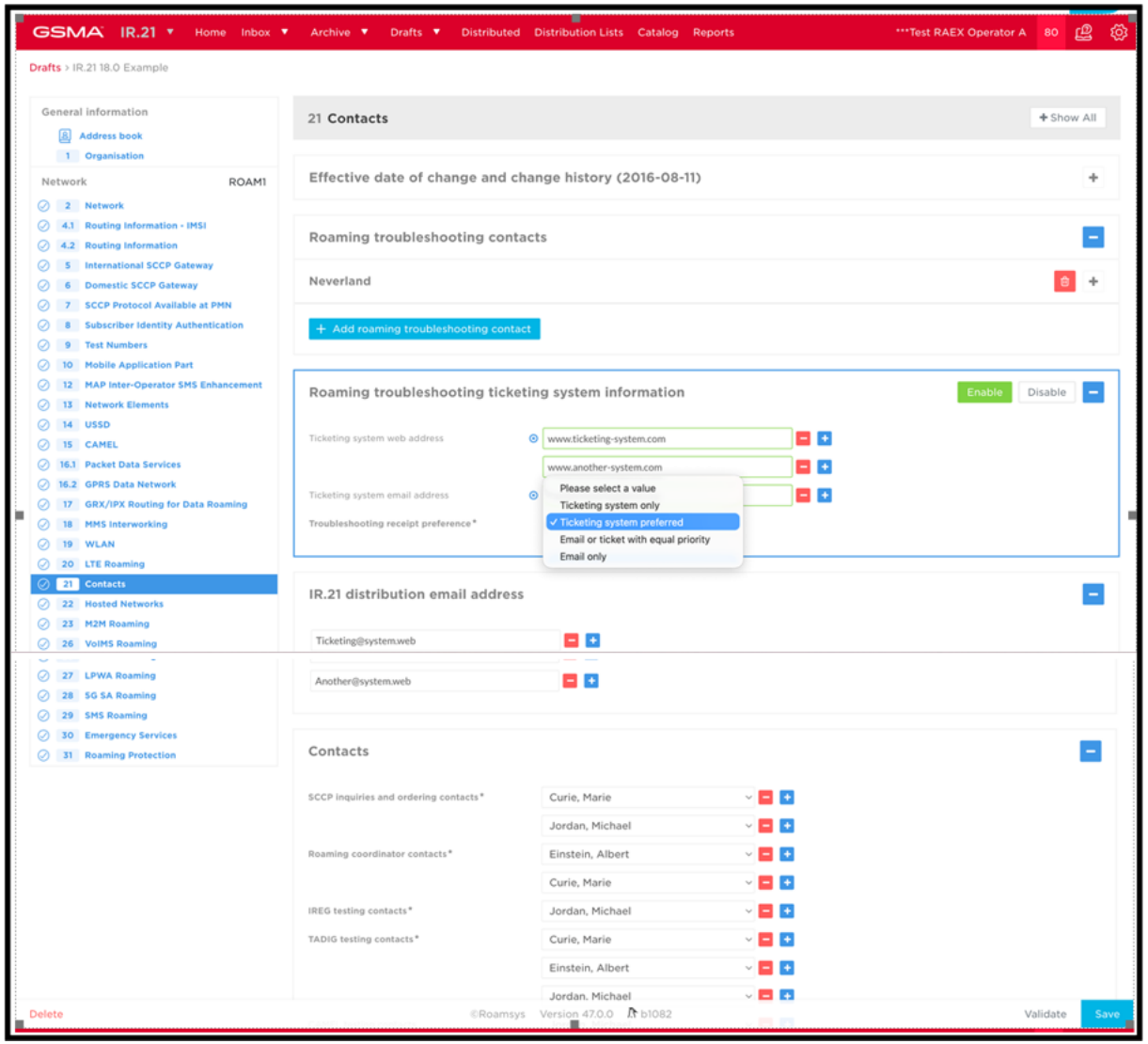


4) Rename SMS Interworking and Introduce Network Type checks



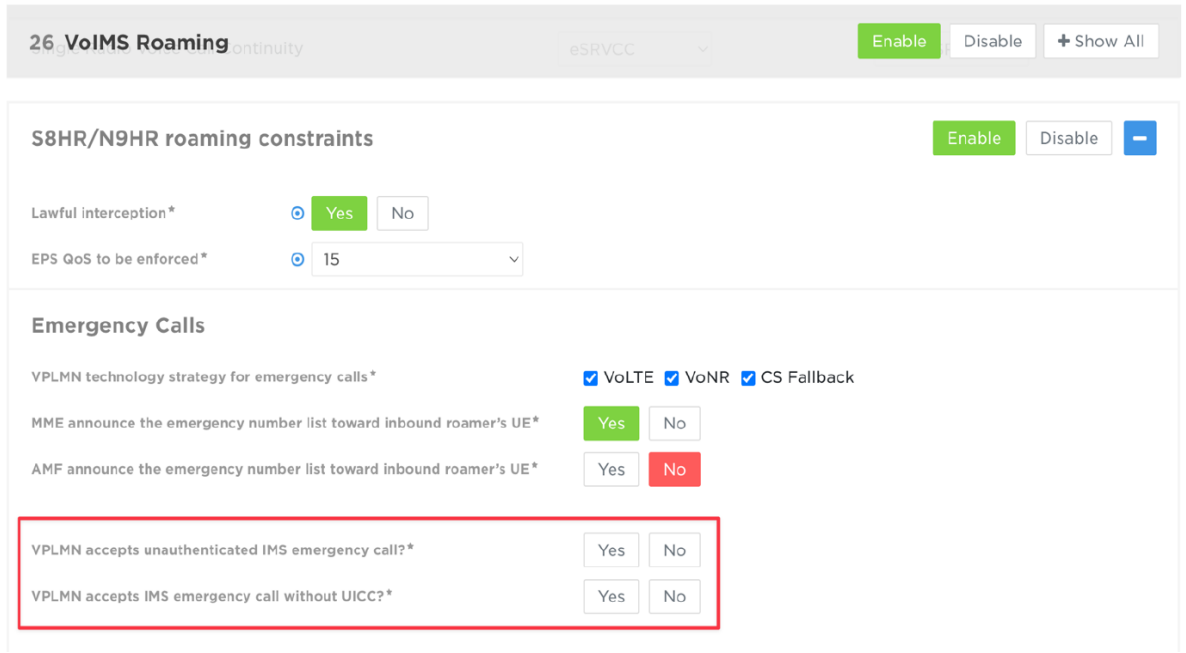
- **Section 1 (Organisation)**
  - Introduce new network type checks
    - M2M Dedicated Operator (M2MDO), M2M Integrated Solution (M2MIS), MVNO (Full), Multi MCC-MNC (IMSI) and MVNO (Light) must always be **HPLMN**.
    - Non-Terrestrial (Aerial), Non-Terrestrial (Maritime), Network Sharing (MOCN), Network Extension must always be **VPLMN**.
  - Network types are now visibly grouped into *Basic* and *Additional* network types, improving data quality.
  - One MCC/MNC must not be allocated to multiple basic network types
- **Section 23 (M2M Roaming)**
  - Make only remaining subsection “Sub range IMSIs” mandatory
- **Section 29 (SMS Roaming)**
  - Rename subsection “SMS Interworking” to “SMS Exchange”

5) Contacts section improvement



- Fixed and mobile phone numbers have been merged
- Each contact must have at least a phone number *or* an email address
- Mandatory contacts **must** have both. This will enhance the reachability of contacts.
- You can use persons *or* teams for each of the available contacts
- A new troubleshooting receipt preference has been added

6) Additional Emergency Call Configurations and New Report

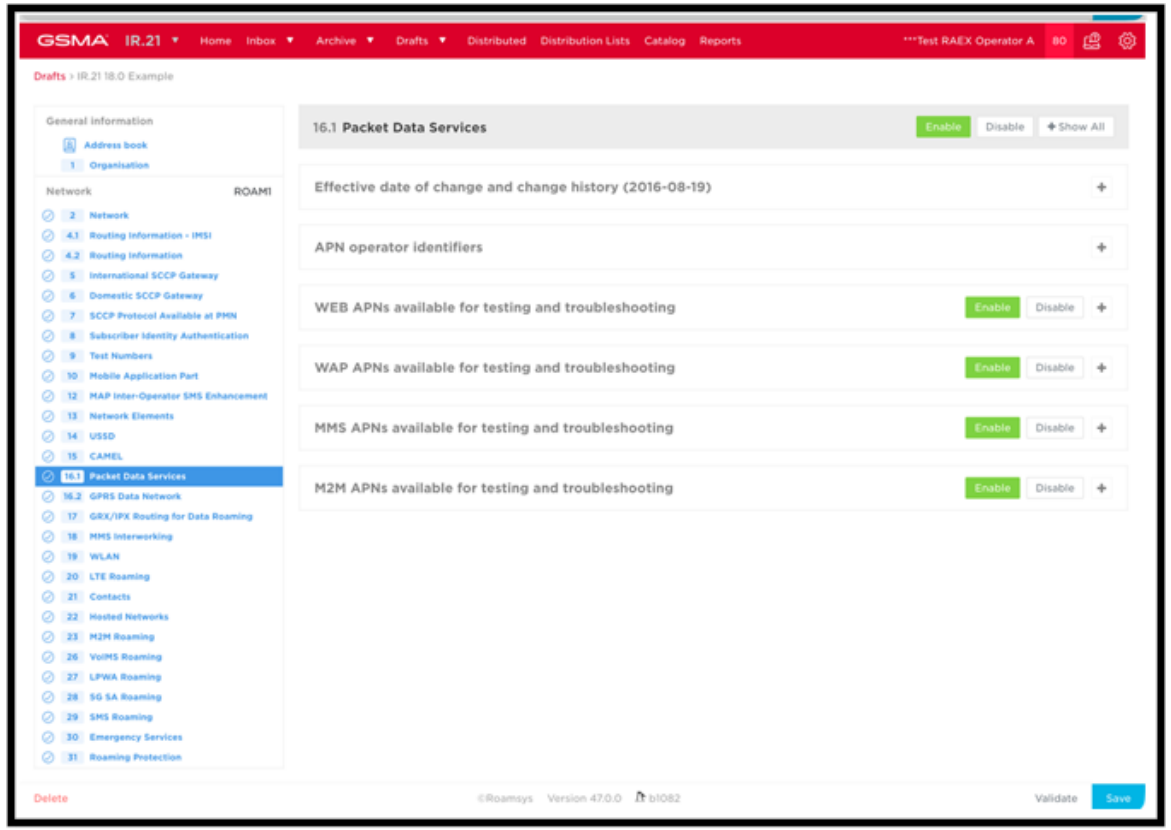


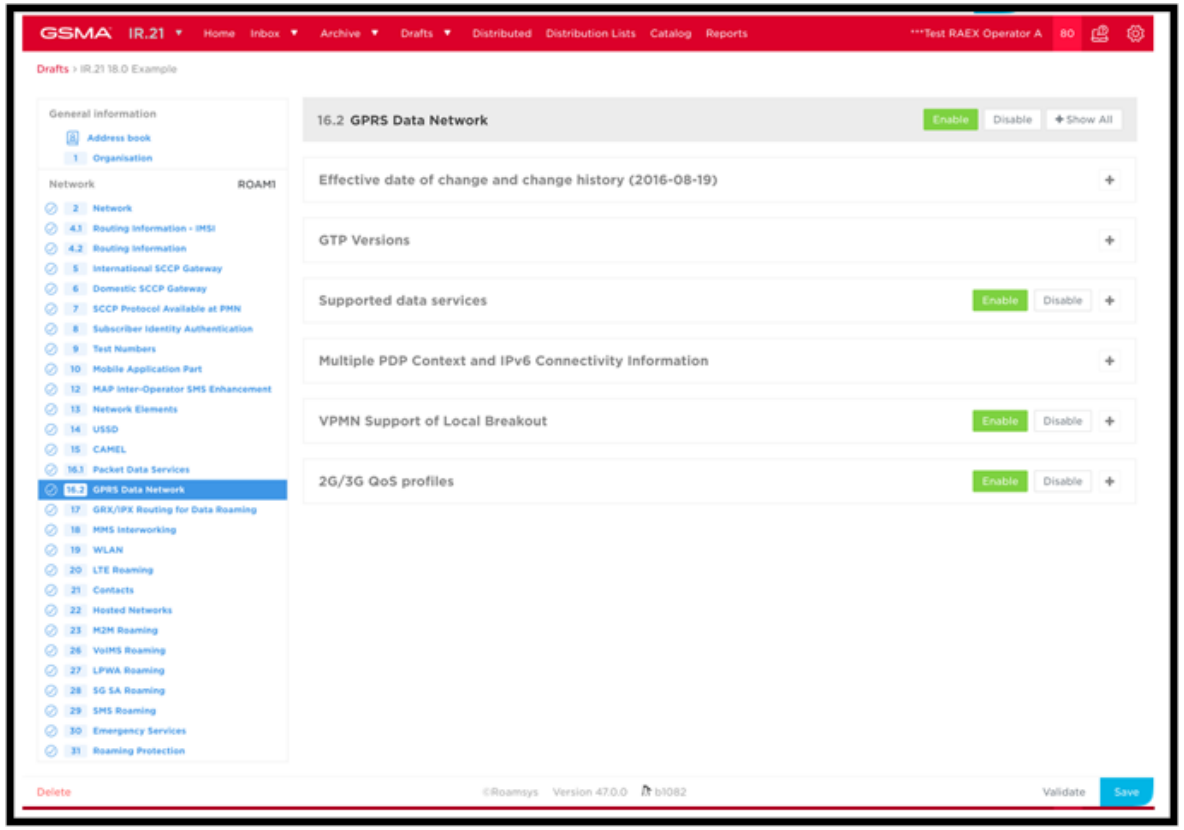
Additional emergency call configurations shall be added.

- **Section 26 (VoIMS Roaming)**
  - New mandatory option “VPLMN accepts unauthenticated IMS Emergency call?” (Yes / No)
  - New mandatory option “VPLMN accepts IMS Emergency call without UICC?” (*Universal Integrated Circuit Card*) (Yes / No)
- **IR.21 Reports**
  - Add new options to new Emergency Calls reports
    - VPLMN accepts unauthenticated IMS Emergency call
    - VPLMN accepts IMS Emergency call without UICC
      Add new report for local emergency numbers in use at the VPLMN
    - Number
    - Service
    - URN (*Uniform Resource Name*) information (list)

Additionally… Packet Data and GPRS Data have been split …

Packet and GPRS (*General Packet Radio Service*) Data have been split into two sections 16.1 and 16.2, serving to provide better clarity:





Roaming Gateway Usability Improvements

1) RAEX Tools Usability Improvements

1) No more default values for elements within the following Sections, requiring users to complete all fields thus helping to improve overall data quality:

2 Network	**4 Routing**	**5 International SCCP Gateway**	**7 SCCP Protocol Available at PMN**	**8 Subscriber Identity Information**
14 USSD	**15 CAMEL**	**16 Packet Data Services**	**18 MMS Interworking**	**20 LTE Roaming**
22 Hosted Networks	**26 VoIMS Roaming**	**27 LPWA Roaming**	**28 5G SA Roaming**	**29 SMS Roaming**

29 SMS Roaming

o SMS over IP (Supported / Unsupported)
o SMS over NAS via SS7 (Supported / Unsupported)
o SMS over NAS via diameter (Supported / Unsupported)
o SMS over NAS via HTTPS (Supported / Unsupported)

22 Hosted Networks

o Network type (Terrestrial / Non-Terrestrial / …) – Select box

2 Networks

o Service Status - Planned Closure and Availability (Radio Network) (Supported/ Unsupported)

o Service Status - Planned Closure and Availability (Core Network) (Supported / Unsupported)

o 2G-GSM frequencies (Supported / Unsupported)

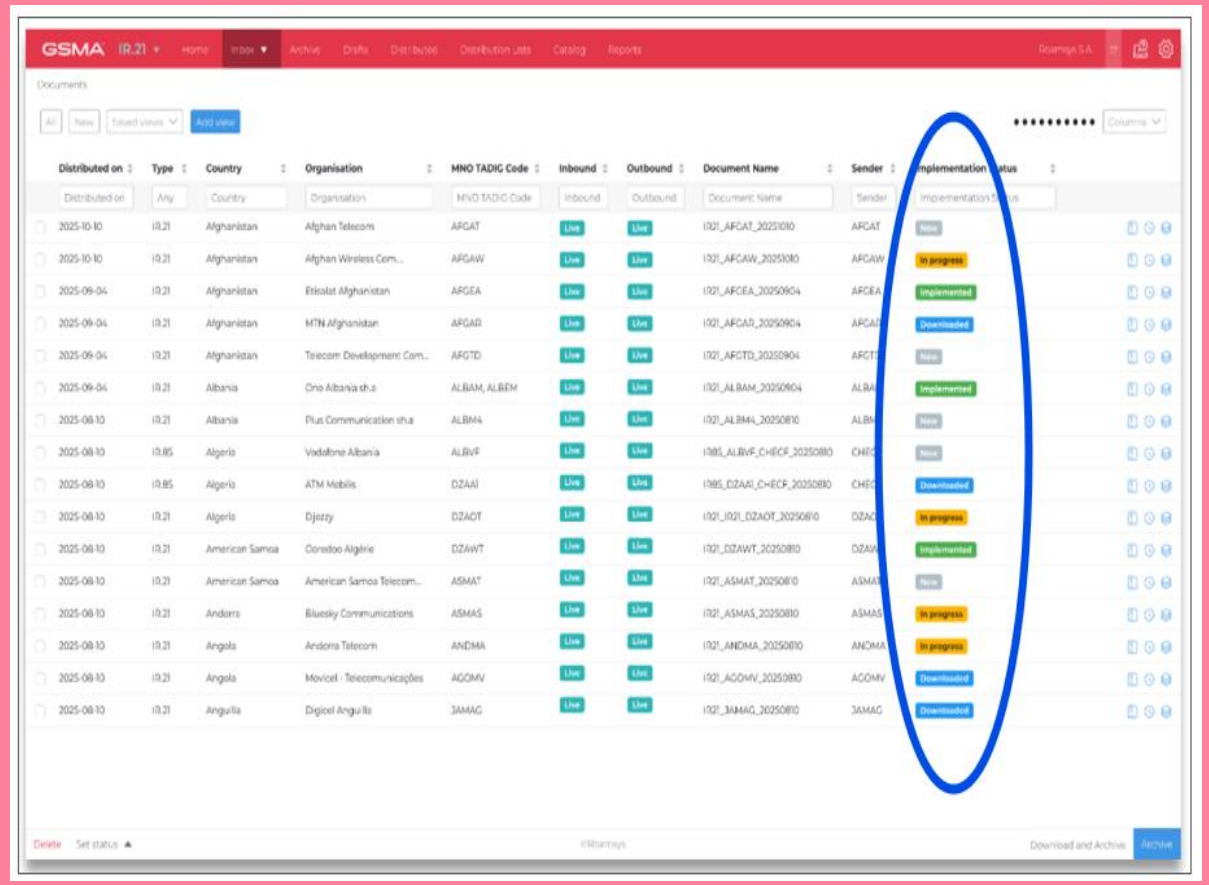
o 3G-UTRA/FDD frequencies (Supported / Unsupported)

o 3G-UTRA/TDD frequencies (Supported / Unsupported) …

RAEX Tools Usability Improvements (Contd.)

2) Add IR.21 implementation status:

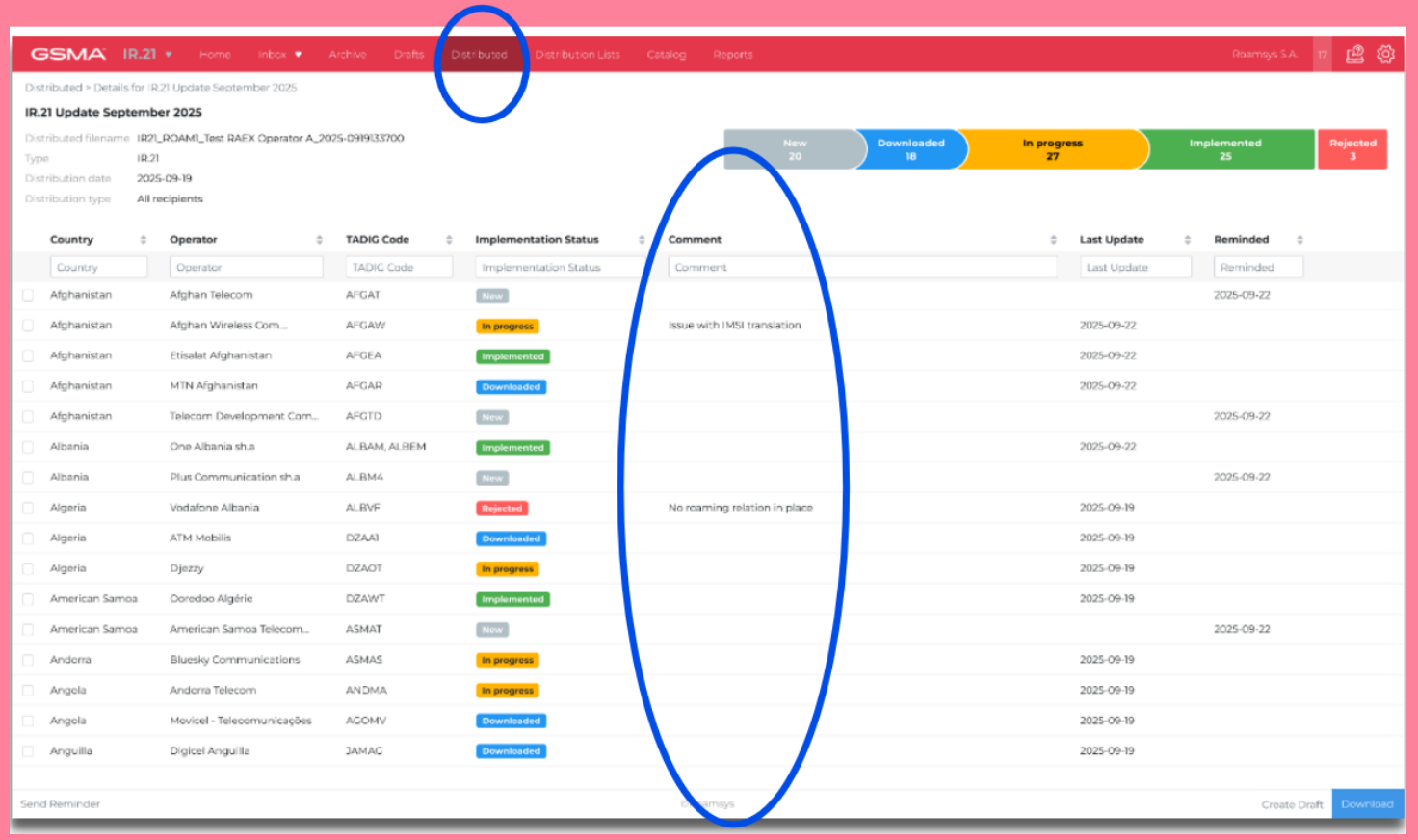
- **The IR.21 Inbox and Archive** sections shall be enhanced to support an **IR.21 implementation status** which shall be shared across **sender and receiver of an IR.21 document**. The status values shall be the following: “New” (Default), “Downloaded”, “In Progress”, “Implemented”, “Rejected”. The Archive section shall show the latest implementation status for each operator on the overview and a detailed status for each received document on the details page.
- When downloading one or multiple documents from the Inbox, a dialog shall ask if the IR.21 implementation status shall be updated. “**Downloaded**” should indicate that a document has been received by the roaming partner, while “**In Progress**” indicates that the actual implementation has started. This could also be set via API, e.g. if the download of a file triggers a configuration update. The same actions shall be possible from the Archive overview as well as from the Archive details pages.



RAEX Tools Usability Improvements (Contd.)

2) Add IR.21 implementation status Contd:

- The “Set status” dialog shall include a text field for providing feedback to the sender of the distributed document (e.g., “There is an error in the IMSI translation table.”). This feedback will appear as a comment on the sender’s document, using the same mechanism already in place for deleted documents.
- The **Distributed details section** for a document shall show the IR.21 implementation status for each recipient. If comments have been entered by the recipients, these shall be shown in the “Comment” column.



2) Update All IR.21 Reports and Add 13 New Reports

- **Update existing IR.21 reports**
  - Add sender TADIG code to all existing reports
  - Add IPX VLAN information to “Connection to inter-PMN IP backbone“ report

- **Add 13 new reports** with customisable views and export functionality (**Overleaf**)

Add 13 New Reports (Contd.)

IR.21 version: List the IR.21 version per operator	Mobile global title information	Short number translation	2G/3G QoS profiles	Connection to inter-PMN IPv6 backbone
Authoritative DNS servers	Local caching DNS servers	GRX/IPX providers	LTE QoS profiles	VoIMS roaming services
	SEPP information	5G QoS profiles	SMS capabilities	

Add 13 New Reports (Contd.)

2G/3G QoS profiles
(Section 16 (Packet Data Services))

- Section 16 (Packet Data Services)
  - 2G/3G QoS profiles
    - Profile name
    - Traffic class type (List)
    - ARP (List)
    - Evolved ARP (Boolean)
    - Evolved ARP priority level (List)
    - Evolved ARP preemption vulnerability (Boolean)
    - Evolved ARP preemption capability (Boolean)
    - Maximum bit rate uplink (Kbps)
    - Maximum bit rate downlink (Kbps)
    - Delivery order (Boolean)
    - Maximum SDU size
    - SDU format information (List)
    - SDU error ratio (Enumeration)
    - Residual bit error rate (Enumeration)
    - Delivery of erroneous SDU (Boolean)
    - Guaranteed bit rate uplink (Kbps)
    - Guaranteed bit rate downlink (Kbps)
    - Traffic handling priority (List)
    - Speech source support (Boolean)
    - Signalling indication support (Boolean)

LTE QoS profiles
(Section 20 (LTE Roaming))

- Section 20 (LTE Roaming)
  - LTE QoS profiles
    - Profile name
    - QCI value (List)
    - QoS ARP (List)
    - Evolved ARP preemption vulnerability (Boolean)
    - Evolved ARP preemption capability (Boolean)
    - Maximum bit rate uplink (Kbps)
    - Maximum bit rate downlink (Kbps)
    - Guaranteed bit rate uplink (Kbps)
    - Guaranteed bit rate downlink (Kbps)

Add 13 New Reports (Contd.)

SEPP information (Section 28 (5G SA Roaming))

- Section 28 (5G SA Roaming)
  - SEPP information
    - SEPP model (Enumeration)
    - MCC/MNC (List)
    - Well-known FQDN
    - SEPP FQDN
    - IPX provider name
    - IPX provider ASN
    - TLS protocol (Boolean)
    - PRINS protocol (Boolean)

5G QoS profiles (Section 28 (5G SA Roaming))

- Section 28 (5G SA Roaming)
  - 5G QoS profiles
    - Profile name
    - 5QI (List)
    - ARP priority level (List)
    - ARP preemption vulnerability (Boolean)
    - ARP preemption capability (Boolean)
    - Maximum bit rate uplink (Kbps)
    - Maximum bit rate downlink (Kbps)
    - Guaranteed bit rate uplink (Kbps)
    - Guaranteed bit rate downlink (Kbps)

Add 13 New Reports (Contd.)

Do Note:

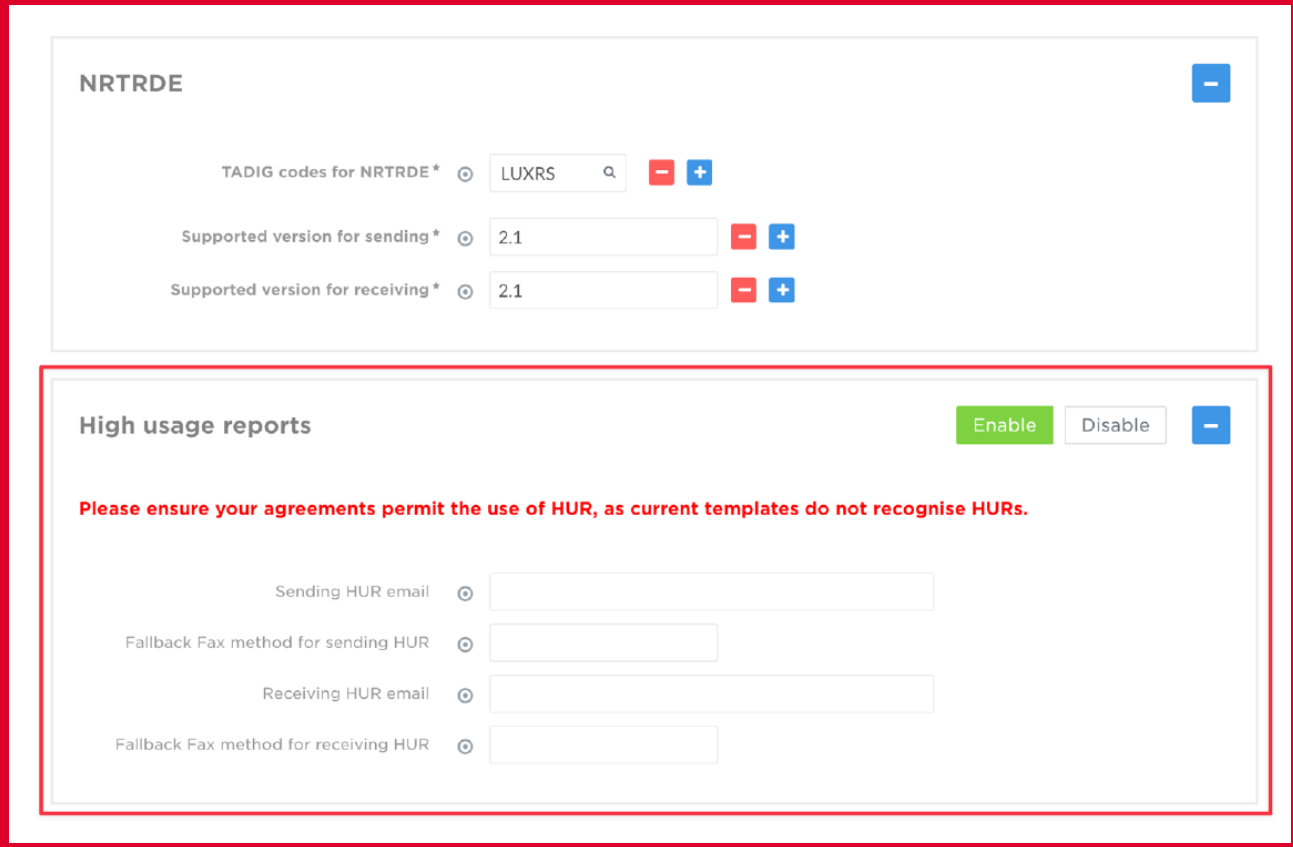
→ Reports shall show data from the latest IR.21 document of all organisations that have been distributed to all roaming partners
→ Reports shall only show data from sections that have not been hidden by operators
→ It shall be possible to export all reports as CSV and Excel
→ Current architecture needs to be adapted to support the expanded reports section.

Change Due to New Operational Data Requirements

Update Fraud section layout

The Operational Data Fraud section shall be updated:

- Show NRTRDE above High Usage Reports
- Group existing HUR elements in a new “High Usage Reports” subsection with Enable /Disabled buttons (Disabled by default)
  - Sending HUR emails
  - Fallback fax method for sending HUR
  - Receiving HUR emails
  - Fallback fax method for receiving HUR
- Add a red warning text if enabled: “Please ensure your agreements permit the use of HUR, as current templates do not recognise HURs.”



GSMA

RAEX IR.21 User Inputs needed!

- **RAEX users not updating to the latest version risk…**
  - Missing out on optimising interworking/roaming revenue
  - Efficiency benefits
  - Improved customer experience
- **Please update your IR.21 version to Rel 18 and your RAEX version from end of March 2026!** 😊

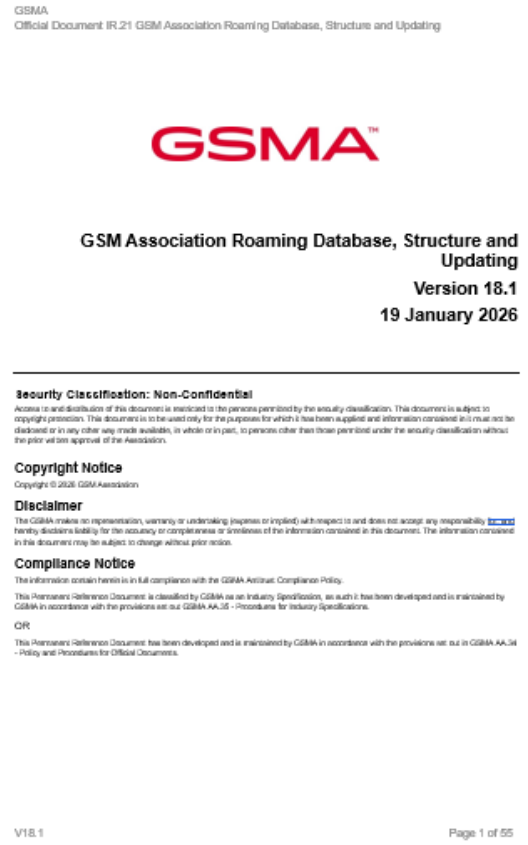
Fabrizio Fiorucci

Roaming Engineer
TIM

Advancing Interoperability in roaming

Agenda

1. IR.21: The International Roaming Industry Specification Number 21
2. Brief history on releases through years
3. RAEX IR.21
4. Rationales of the v18 release
5. Expected features
6. Areas where improvements apply
7. Schema of the approved changes
8. New technology requirements
9. Show me the data: reporting features
10. Ecosystem of numbers: operator’s perspective
11. Steps forward


GSMA
Official Document IR.21 GSM Association Roaming Database, Structure and Updating

GSMA

GSM Association Roaming Database, Structure and Updating

Version 18.1

19 January 2026

Security Classification: Non-Confidential

Access to and distribution of this document is restricted to the persons permitted by the security classification. This document is subject to copyright protection. This document is to be used only for the purposes for which it has been supplied and information contained in it must not be disclosed or in any other way made available, in whole or in part, to persons other than those permitted under the security classification without the prior written approval of the Association.

Copyright Notice

Copyright © 2026 GSM Association

Disclaimer

The GSMA makes no representation, warranty or undertaking (express or implied) with respect to and does not accept any responsibility [illegible] hereby, disclaims liability for the accuracy or completeness or timeliness of the information contained in this document. The information contained in this document may be subject to change without prior notice.

Compliance Notice

The information contain herein is in full compliance with the GSMA Antitrust Compliance Policy.

This Permanent Reference Document is classified by GSMA as an Industry Specification, as such it has been developed and is maintained by GSMA in accordance with the provisions set out GSMA AA.35 - Procedures for Industry Specifications.

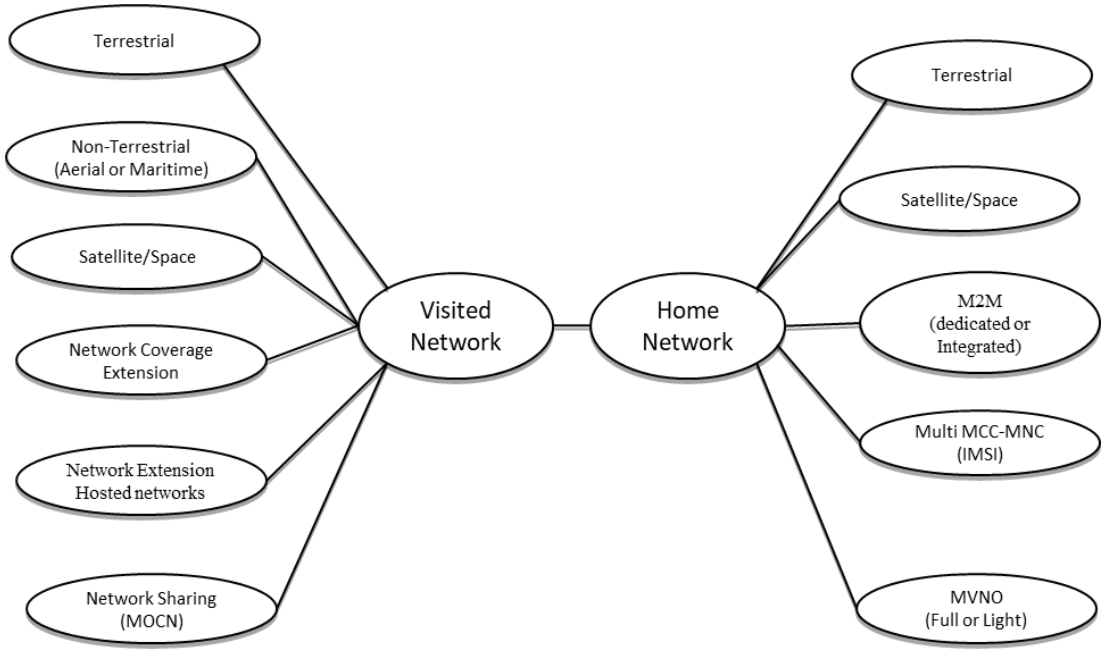
OR

This Permanent Reference Document has been developed and is maintained by GSMA in accordance with the provisions set out in GSMA AA.34 - Policy and Procedures for Official Documents.

V18.1

Page 1 of 55

1- IR.21: International Roaming Permanent Reference Document Number 21



Born as a centralized roaming database for international operators

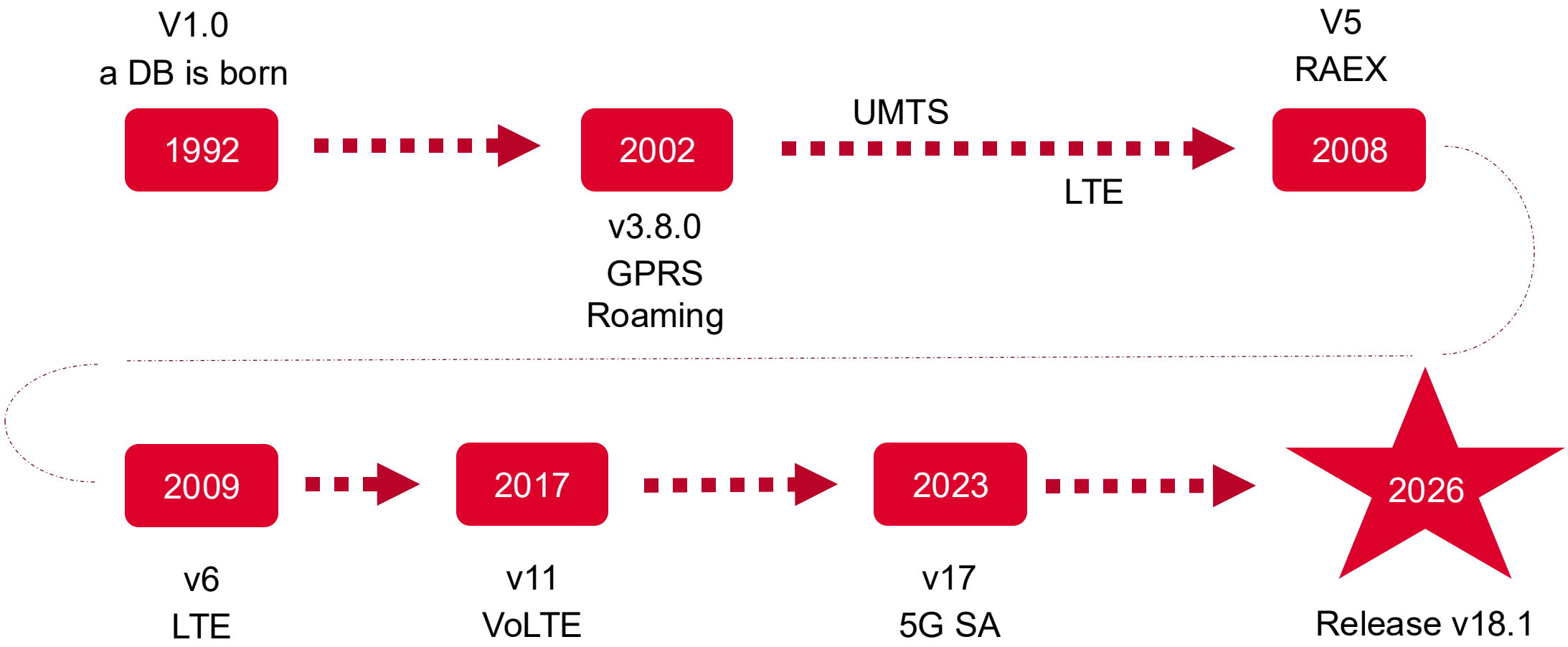
A standard mechanism through which operators share roaming data

Essential for 2G/3G/4G/5G roaming interoperability

Binding reference for all GSMA members to setup and maintain relations

28 structured sections are covering all network types of information

2 – Brief history on releases through years



3 – RAEX IR.21

RAEX stand for Roaming Agreement Electronic eXchange

A standardized format and method to notify and distribute information

Guarantees security and reliability and is available to all GSMA members

Security of the exchanged data means a better service for final customers

Reliable data means less errors in data definition and therefore less impact and issues in the service and networks

A more efficient troubleshooting is one of the key benefits

API methods available to operators to easy build up and maintain internal database

4 - Rationales of the v18 Release

Work coordinated by NRG Chair and supported by the community

Demand from the industry to support the technology evolution in Roaming

Review of the structure and the consistency

Adding new sections of data

- Emergency Services
- Inbound Roaming Protection
- Mission Critical

Improvements through the PRD so through the RAEX database

Extrapolation of use cases in a new PRD (NG.155)

24 CR implemented for v18 and a last CR for v18.1

5 – Expected features

New rules and functionalities within the tool

Industry requirements (MCX, Emergency Services, Roaming Protection)

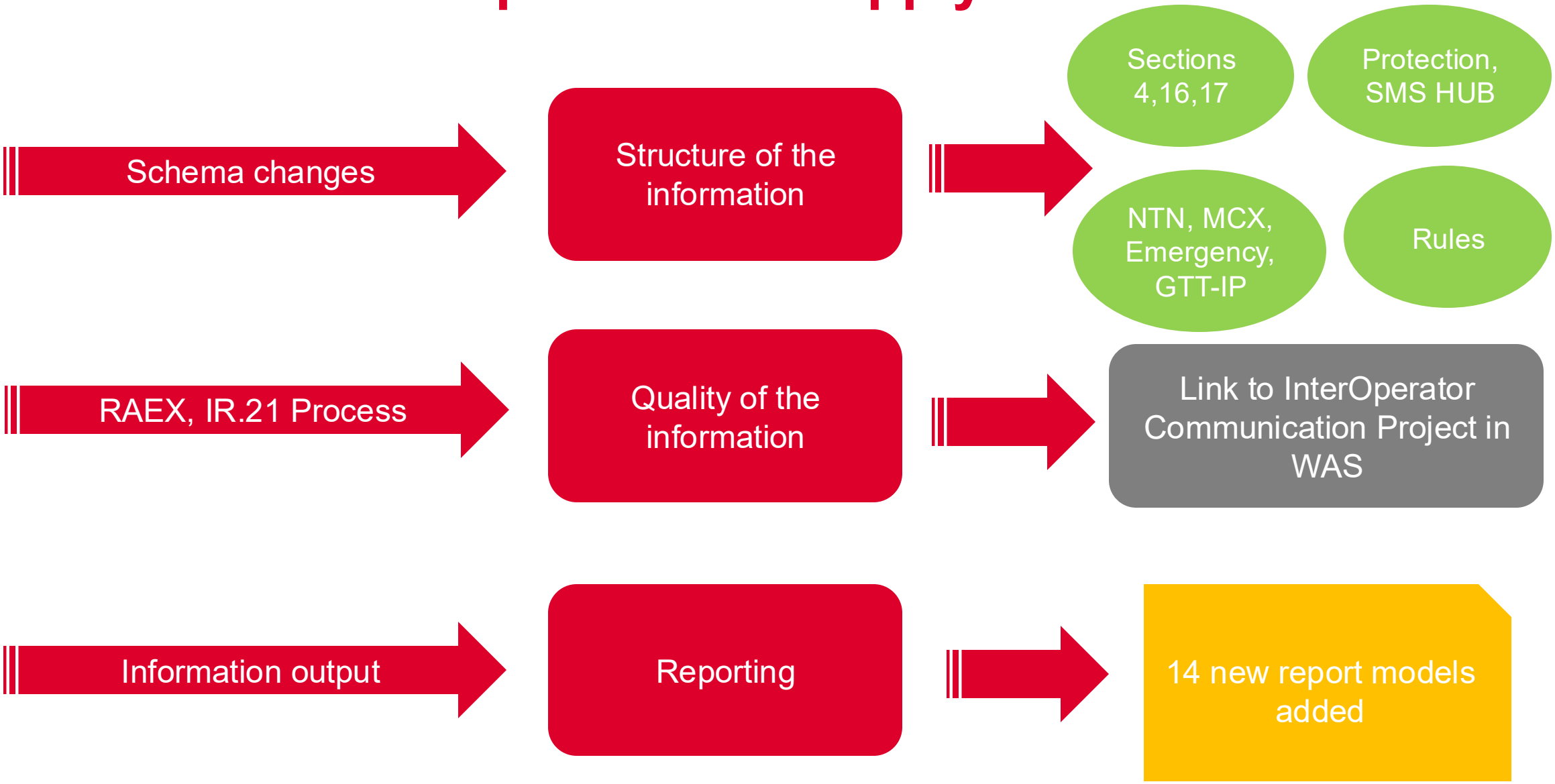
Alignment with the current telecommunications landscape and new technologies

Improvement of numbering definitions with the new market players

Definition of rules for data consistency

Harmonization of the 2G3G Sunset information

6 - Areas where improvements apply



7 - Schema of the approved changes

CR No	Description	Note
CR1105	Inbound Roaming Protection	Structure
CR1110	MSISDN Lenght	Structure
CR1111	GTT-IP	Structure
CR1112	GAP Analysis	Structure
CR1113	Emergency Call Report	Reporting
CR1114	Confidentiality clarifications	Quality
CR1115	Additional Emergency call data	Structure
CR1116	Emergency Section *NEW*	Structure
CR1117	RAEX Tool improvements	Quality
CR1118	Removal of «Public» and Annex C	Quality
CR1119	Annex D updates	Structure
CR1120	Editorial changes	Quality
CR1121	Emergency improvements	Structure

CR No	Description	Note
CR1122	Add of various reports	Reporting
CR1123	Section 4 split	Structure
CR1124	Section 17 improvements	Structure
CR1125	Section 16 improvements	Structure
CR1126	Release section improvements	Quality
CR1127	Contact section improvements	Structure
CR1128	MCX	Structure
CR1129	Improve IP address in Annex D	Structure
CR1130	SMS HUB	Structure
CR1131	Rules	Structure
CR1132	Confidentiality for emergency comm	Structure
CR1133	Editorial changes after R18 approval	Structure

8 - New technology requirements

Emergency Services

Annex A - 30

Mission Critical

Section 2

SMS HUB

Section 12

Inbound Roaming Protection

Annex A - 31

GTT-IP in VoIMS Section

Annex A - 26

9 – Show me the data: reporting features

Public reports are defined in Annex H and are available into Members Gateway RAEX Tool

R18 comes with a big increase of reports

Really useful for not only MNOs but for any member of the industry

IR.21 Version | MGT | Short Number | 2G3G QoS | Auth DNS | Loc Caching DNS | GRX/IPX Provider | VoIMS Roaming | 5G QoS | SEPP Info | LTE QoS | SMS Capability

Emergency Call

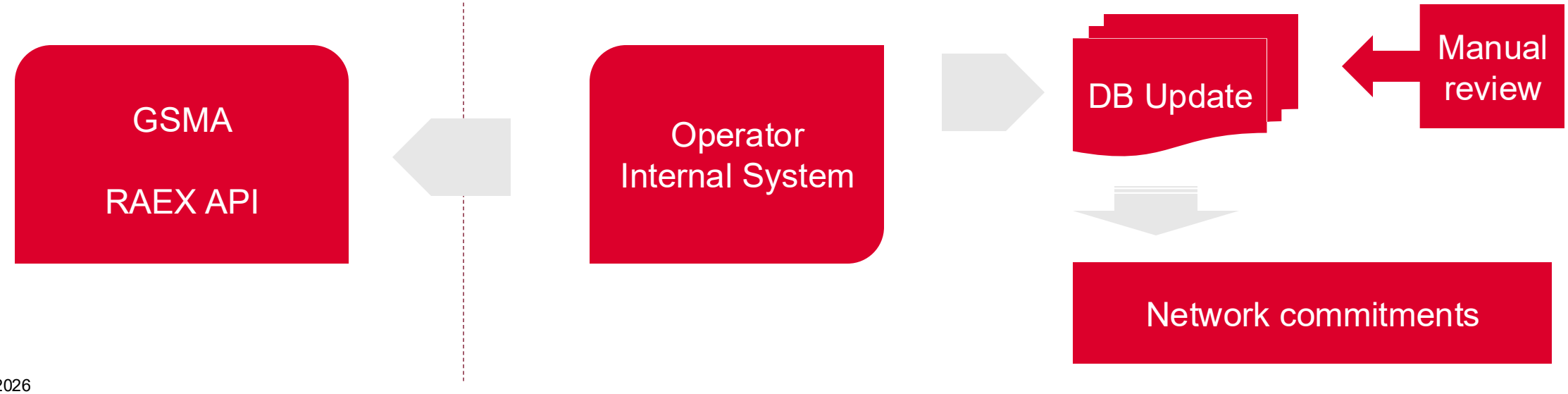
To support emergency calls for inbound roamers (RAEX Section 26)

10 - Ecosystem of numbers: an operator’s perspective

Up to 800 operators are RAEX compliant today

RAEX IR.21 notification system is running on up to 8 new updates per day

This results in a commitment that targets up to 1k changes per month in the network elements



11 - Steps forward

100% RAEX IR.21 compliant: a possible dream?

Create an IR.21 Admin List for the day-by-day cooperation

Integrate new functionalities, enhance API structure and available methods

Technology evolutions

All GSMA community members are invited to take part of this evolution and to the success of this ongoing project through working groups Network Group (NG) / Network Roaming Group (NRG)

Thank You!

GSMA™

Q&A

Thank you

GSMA™