

**MIGRATION OF 112 (NATIONAL EMERGENCY  
NUMBER) AND 117 (NATIONAL FOREST  
PROTECTION NUMBER) TRAFFIC TO IP  
INTERCONNECTION**

**– DECISION –**

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## **1. Framework**

By determination of 05.01.2018<sup>1</sup>, the Board of Directors of Autoridade Nacional de Comunicações (ANACOM) approved the final decision on IP interconnection. This decision refers the process of traffic migration for emergency communications to a specific decision by ANACOM, bearing in mind the nature of communications involved. Pursuant to this decision, migration must be communicated to bodies with responsibilities in the area and carried out following the successful completion of specific tests.

It should be noted that the determination of 05.01.2018 was adopted further to the determination of 21.12.2016<sup>2</sup>, which approves the decision on the review of the wholesale market for call termination on the public telephone network at a fixed location (hereinafter “fixed termination market”). That decision imposed an obligation on all operators with significant market power (SMP) to meet all reasonable requests for the provision of fixed local voice call termination services, applying to both TDM and IP interconnection without distinction, and established the obligation on MEO - Comunicações e Multimédia, S.A. (MEO) to submit a proposal for IP interconnection architecture within a maximum period of four months after the publication of that decision. This proposal was given consideration in the procedure that led to the determination of 05.01.2018.

The decision of 21.12.2016 was subsequently replaced by a decision approved by determination of 28.09.2018<sup>3</sup>, also concerning the fixed termination market. This new decision maintained the obligation to meet all reasonable requests for the fixed local voice call termination services to both TDM and IP interconnection without distinction and kept the conditions and principles applicable to the migration of interconnection traffic from TDM to IP approved in the determination of 05.01.2018.

Under the determination of 05.01.2018, the autonomous decision on the migration process to IP interconnection with specific regard to emergency communications should safeguard the specific aspects relating, among others, to interconnection architecture, numbering and

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<sup>1</sup> Available at: <https://www.anacom.pt/render.jsp?contentId=1427158>.

<sup>2</sup> Available at: <https://www.anacom.pt/render.jsp?contentId=1401971>.

<sup>3</sup> Available at: <https://www.anacom.pt/render.jsp?contentId=1461910>.

portability, with an impact on emergency communications, as well as the performance of tests. It is noted that, in the scope of this decision-making process, all operators agreed with the transition of these calls to IP interconnection.

With the migration of traffic to IP interconnection nearing completion, it is appropriate to start migrating 112 emergency communications and 117 communications to IP interconnection.

To this effect, ANACOM met on 17.02.2021 with representatives of MEO to discuss this issue, and following this meeting requested MEO to send information on the technical changes to be introduced in the Reference Interconnection Offer (RIO) so as to render the migration of 112 and 117 traffic to IP interconnection operational, which occurred on 11.03.2021.

After analysing the technical proposal for IP interconnection for 112 and 117 traffic, as well as the migration schedule proposed by MEO, ANACOM's Board of Directors approved, on 29.04.2021, the draft decision (DD) on the migration of 112 (national emergency number) and 117 (national forest protection number) traffic to IP interconnection. The DD was submitted to a prior hearing procedure in accordance with articles 121 and 122 of the Administrative Procedure Code (APC) and to a general consultation procedure under article 8 of the Electronic Communications Law (Law No 5/2004, of 10 February, in its current wording).

ANACOM received, within the deadline, five responses on behalf of eight bodies. A report on the prior hearing and public consultation procedures was prepared, which includes a summary of contributions received and the Regulatory Authority's positions in this regard. The report forms an integral part of this decision.

This document consists of the final decision on the migration of 112 (national emergency number) and 117 (national forest protection number) traffic to IP interconnection.

Point 2 thus sets out a brief summary of the relevant issues of the proposal presented by MEO in the information sent to ANACOM, as well as the positions of this Authority on those issues. Point 3 deals with the migration plan, including schedule and tests. Finally, point 4 presents the decision on this matter.

## **2. Technical proposal for IP interconnection for 112 and 117 communications**

The architecture and topology of the IP interconnection network, as well as most of the technical characteristics and other parameters defined in RIO for IP interconnection also apply to the processing and routing of emergency communications (112 and 112 eCall) and traffic associated with the forest protection number (117) carried over IP interconnection. However, given the particular features of these communications, there are some specific parameters that may or may not apply to them, namely those that include location. These specificities will be analysed in the next sections.

### **2.1. Technical proposal for IP interconnection for emergency service communications (112 and 112 eCall)**

#### **MEO's proposal**

112 and 112 eCall communications have specific features at the level of parameterisation of signalling messages which do not exist in the other communications. In fact, these calls have associated functionalities such as caller location and caller ID, which must be forwarded when the call is routed. In this scope, MEO proposes that the national solution to identify and locate mobile origins retains the information contained in the following ISUP parameters: ISUP Calling Party Number; Called Party Number, ISUP Redirection Information; ISUP Redirecting Number and Original Called Number. Consequently, the contents of these parameters must be carried in the corresponding SIP headers, in line with the 3GPP TS 29.163<sup>4</sup> standard and the following mapping tables:

- Table 7.4.6.2.3.1: Mapping of IAM to SIP INVITE request;
- Table 14: Mapping of calling party number parameter to SIP P-Asserted-Identity header fields;
- Table 10a: Mapping ISUP Called Party Number to SIP Request-URI and To header field (adapted to the Portuguese context).

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<sup>4</sup> <https://portal.3gpp.org/desktopmodules/Specifications/SpecificationDetails.aspx?specificationId=1609>

As an alternative, the Diversion header may be used to carry the location information, according to the mapping indicated in RFC 5806<sup>5</sup>.

### **ANACOM's Position**

ANACOM agrees with MEO's proposal, having included in the **ANNEX** to this decision, in addition to the codification and mapping proposed by MEO, the method for identifying the origin of the call, carried out through a geographical area identification suffix, as well as the indication of the IP GIP where the traffic should be delivered. With regard to the codec to be used in eCalls, ANACOM considers that it should conform to the codec used in calls, so the indication of the G.711A codec as the preferred one was deleted.

## **2.2. Technical proposal for IP interconnection for communications to the forest protection number (117)**

### **MEO's proposal**

As far as 117 communications are concerned, MEO proposes that the national solution for call origin identification retains the information contained in the following ISUP parameters: ISUP Calling Party Number; Called Party Number. Consequently, the contents of these parameters must be carried in the corresponding SIP headers, in line with the 3GPP TS 29.163 standard and the following mapping tables:

- Table 14: Mapping of calling party number parameter to SIP P-Asserted-Identity header fields;
- Table 10a: Mapping ISUP Called Party Number to SIP Request-URI and To header field (adapted to the Portuguese context).

### **ANACOM's Position**

ANACOM agrees with MEO's proposal, having included in the **ANNEX** to this decision, in addition to the codification and mapping proposed by MEO, the method for identifying the

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<sup>5</sup> <https://tools.ietf.org/html/rfc5806>

origin of the call, carried out through a geographical area identification suffix, as well as the indication of the IP GIP where the traffic should be delivered.

### **3. Migration plan**

#### **MEO's proposal**

In the meeting held on 17.02.2021, MEO mentioned that it considers that a six-month period is sufficient to migrate the emergency communications traffic (112 and 112 eCall) and traffic associated with the forest protection number (117) to IP interconnection. In addition, it proposed that TDM interconnections remain active for a further six months after the conclusion of the migration to IP, thereby safeguarding against any failures and enabling the rollback of this traffic.

#### **ANACOM's Position**

With regard to the maximum migration period, ANACOM believes that it should be as short as possible, given that the migration of traffic to IP interconnection is at an advanced stage, and that it is in the interest of all parties involved to quickly conclude the migration to IP interconnection, due to the efficiency gains that the conclusion of this process will have on the management and maintenance of operators' networks. However, the time limit in question cannot be so short as to affect the operation of 112 emergency calls or 117 calls, given the nature of communications involved.

In the light of the above, ANACOM takes the view that a period of six months, from the date of publication of the RIO with the amendments defined in ANACOM's decision, is an adequate period for migration to IP interconnection for the calls at stake, namely because the IP interconnection infrastructure has already been agreed and implemented by the various operators, with IP interconnection being operational for most traffic. All that remains now is to configure and parameterise the re-routing of traffic associated with 112 emergency calls and 117 calls.

During this period MEO and the other operators should implement and configure the solution that will be incorporated into RIO for the migration of 112 and 117 traffic to IP interconnection. Any interoperability tests that may be required should take place during

this period. As soon as the IP interconnection proposal for 112 and 117 traffic is included in the RIO, MEO and the operators with which MEO is interconnected must reach an agreement on the migration of this traffic. The scheduling of tests by MEO, in line with the 112 PSAP<sup>6</sup>, must follow the order of receipt of interconnection requests from operators.

As regards the deactivation of TDM GIPs, following the completion of the migration of all interconnection traffic with MEO's fixed network including traffic to 112 and to 117, ANACOM recalls the provision set out in the determination of 05.01.2018: *"As for the deactivation of TDM GIPs after the migration of all the interconnection traffic with MEO's fixed network, including originating traffic, ANACOM understands that in the absence of TDM traffic it might be reasonable for MEO to proceed accordingly. Nonetheless, this deactivation should also be analysed in the specific framework of the autonomous decision to be adopted regarding the migration to IP interconnection with respect to emergency communications, in which context it could be appropriate to retain some capacity for TDM interconnection, an issue that will be evaluated as part of an autonomous decision."*

After the conclusion of the IP migration process, given the importance and care that emergency calls require, a six-month period in which TDM interfaces should remain active to accept 112 and 117 TDM traffic is considered reasonable. During this period, MEO must report on a monthly basis to ANACOM the number of 112 and 117 calls processed in TDM interfaces and which operators originate them. This information must be sent no later than 10 working days after the end of each monthly reporting period. The report must include the identification of the traffic processed on TDM interfaces, including the origin of the call, measures taken to transfer this traffic to the IP interface, and the likelihood of a similar situation occurring. At the end of this six-month period, TDM interfaces may be deactivated, except where, in view of the existence of 112 or 117 traffic on TDM interfaces, ANACOM notifies operators to suspend the deactivation process of these interfaces until the reasons for the existence of this traffic are investigated and measures to resolve it are implemented.

MEO is required to inform MAI (the Ministry of Home Affairs) and ANACOM of the effective date of deactivation of the TDM interconnection one month in advance.

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<sup>6</sup> Public Safety Answering Points.

#### **4. Conclusion and determination**

In view of the grounds explained in the previous points, ANACOM's Board of Directors, pursuant to articles 63, 64, 66 and 68 of the Electronic Communications Law (ECL), under paragraph 1 q) of article 26 of the Statutes, approved by Decree-Law No 39/2015, of 16 March, and further to the determination of 05.01.2018 on IP Interconnection, hereby determines:

- a. To order MEO to include in the Reference Interconnection Offer (RIO) the IP interconnection proposal for traffic associated with emergency services (112 and 112 eCall) and with the forest protection number (117), under the terms set out in the ANNEX to this decision, within 10 working days following the communication of the final decision to MEO. ANACOM should subsequently be informed of these changes, within 10 working days of the publication of the RIO.
- b. That a deadline of six months from the publication of the RIO is hereby set for all operators for migrating emergency communications traffic (112 and 112 eCall) and traffic of communications to the forest protection number (117) to IP interconnection.
- c. That after the migration there will still be a period of six months during which TDM interfaces will be active to accept 112 and 117 TDM traffic. During this period, MEO must report on a monthly basis to ANACOM the number of 112 and 117 calls processed in TDM interfaces and which operators originate them. This information must be sent no later than 10 working days after the end of each monthly reporting period. The report must include the identification of the traffic processed on TDM interfaces, including the origin of the call, measures taken to transfer this traffic to the IP interface, and the likelihood of a similar situation occurring. At the end of the six-month period, TDM interfaces may be deactivated, except where, in view of the existence of 112 or 117 traffic on TDM interfaces, ANACOM notifies operators to suspend the deactivation process of these interfaces until the reasons for the existence of this traffic are investigated and measures to resolve it are implemented.

# ANNEX

## Principles of traffic interconnection

### Emergency Service – 112

Traffic to this service must be delivered to the two IP geographic points of interconnection (GPI) in Lisbon or Oporto, through the respective IP points of interconnection (PI), in the “**1122xy**” format, where “**2xy**” is the identification code of the Network Group of the location where the call was originated, except in the cases of Lisbon and Oporto, where “**2xy**” is equal to “**210**” and “**220**” respectively. Any exceptions resulting from the location of the call centres will be communicated by MEO to OSP.

In the case of eCalls, the traffic to “**1126xy**” services for manual eCalls and to “**1127xy**” services for automated eCalls, must be delivered by mobile operators in the two IP GPIs in Lisbon or Oporto, via their respective IP PIs.

### Forest Protection Service – 117

Traffic to this service must be delivered to the two IP GPI of Lisbon or Oporto, through the respective IP PIs, in the “**1172xy**” format, where “**2xy**” is the identification code of the Network Group of the location where the call was originated, except in the cases of Lisbon and Oporto, where “**2xy**” is equal to “**210**” and “**220**” respectively.

## Signalling codes associated with 112 and 117 calls

The solution established by the E112 Regulation for mobile origination identification and location for calls to the 112 emergency number uses the following ISUP protocol parameters:

- ‘ISUP Calling Party Number’;
- ‘Called Party Number’;
- ‘ISUP Redirection Information’;
- ‘ISUP Redirecting Number’;
- ‘Original Called Number’.

When transferring 112 or 117 calls to IP interconnection from mobile or fixed origins, or when generating them, it must be ensured that the contents of the parameters listed above (where

applicable) are carried in the corresponding SIP header, in accordance with 3GPP TS 29.163 and respective mapping tables:

**Messages:**

- Mapping of **IAM (Initial Address Message)** to **SIP INVITE request**

ISUP Parameter or IE	Derived value of parameter field	SIP component	Value
IAM		INVITE request	
Redirecting number		History-Info header field	IF Redirection counter exceeds 1 hi-targeted-to-uri of the penultimate created hi-entry (NOTE 9) IF Redirecting number is available set to the value of the Redirecting number ELSE set to the Unknown User Identity (NOTE 10) ELSE no mapping (NOTE 8)
Nature of address indicator:	"national (significant) number"	hi-targeted-to-uri	Add CC (of the country where the MGCF is located) to Redirecting number Address Signals to construct E.164 number in URI.
	"international number"		Map complete Redirecting number Address Signals to E.164 number in URI.
Address Signals	If NOA is "national (significant) number" then the format of the Address Signals is: NDC + SN If NOA is "international number" then the format of the Address Signals is: CC + NDC + SN	hi-targeted-to-uri	Addr-spec "+" CC NDC SN mapped to userinfo portion of SIP URI. (NOTE 5) Add "user=phone".
Redirecting number	<b>APRI</b>	Privacy "headers" component of the penultimate hi-targeted-to-uri entry in the History-Info header	<b>Priv-value</b>
	"presentation restricted"		"history"
	"presentation allowed"		Privacy header field absent or "none" (NOTE 3)
Redirection Information	<b>Redirecting indicator</b>	Privacy "headers" component of the penultimate hi-targeted-to-uri entry in the History-Info header	<b>Priv-value</b>
	Call diverted		Privacy header field absent or "none" (NOTE 4)
	Call diverted, all redirection information presentation restricted		"history"

ISUP Parameter or IE	Derived value of parameter field	SIP component	Value
Redirection Information	1	hi-index and "mp" header field parameter (NOTE 7)	Number of diversions is shown to the number of levels in hi-index. Index for Original called number = 1 Index for Called party number = 1.1 and addition of "mp=1"
	2		Index for Original called number = 1 Index for Redirecting number = 1.1 and addition of "mp=1" Index for Called party number = 1.1.1 and addition of "mp=1.1"
	N		Index for Original called number = 1 Placeholder History-Info hi-entry with Index = 1.1 and addition of "mp=1" ... Fill up ... Index for Redirecting number = 1.[(N-1)* ".1"] and addition of "mp" set to the hi-index value of the hi-targeted-to-uri that precede. Index for Called party number = 1.N* ".1" (e.g. N=3 → 1.1.1.1) and addition of "mp=1.[(N-1)*].1"
Redirection Information	<b>Redirecting Reason and Original Redirection Reason (NOTE 1)</b>	hi-targeted-to-uri; Reason "headers" component as defined in IETF RFC 7044 [91] with cause parameter. For a placeholder History-Info hi-entry the value "404" shall be taken (NOTE 2). Cause parameter for redirecting reason will be put in the entry of redirecting number, and cause parameter for original redirection reason will be put in the entry of original called number.	<b>Cause parameter value</b>
	<i>unknown/not available</i>		404
	<i>unconditional</i>		302
	<i>User Busy</i>		486
	<i>No reply</i>		408
	<i>Deflection during alerting</i>		302
	<i>Deflection immediate response</i>		302
<i>Mobile subscriber not reachable</i>	503		

ISUP Parameter or IE	Derived value of parameter field	SIP component	Value
Called Party Number	See Redirecting number Nature of address indicator and Address signal	History-Info header field see hi-targeted-to-uri	URI of the last hi-targeted-to-uri entry of History-Info header field (NOTE 6)
Original called number	See Redirecting number Nature of address indicator and Address signal	History-Info header field see hi-targeted-to-uri	URI of first hi-targeted-to-uri entry of History-Info header field (NOTE 5, NOTE 9) IF the Original called number is available: set to the value of the Original called number ELSE IF the Redirection counter equals 1 AND the Redirecting number is available, set to the value of the Redirecting number ELSE set to the Unknown User Identity (NOTE 10)
Original called number	<b>APRI</b> " <i>presentation restricted</i> " " <i>presentation allowed</i> "	Privacy "headers" component of the first hi-targeted-to-uri entry of History-Info header	<b>Priv-value</b> " <i>history</i> " Privacy header field absent or " <i>none</i> "
<p>NOTE 1: Original Redirection Reason contains only the "unknown/not available " parameter</p> <p>NOTE 2: For all History-Info hi-entries except the last one a cause parameter in Reason "headers" component as defined in IETF RFC 7044 [91] has to be included.</p> <p>NOTE 3: If the Redirecting indicator has the value "Call diverted, all redirection information presentation restricted", the privacy value "history" shall be set.</p> <p>NOTE 4: If the redirecting number APRI has the value "presentation restricted", the privacy value "history" shall be set.</p> <p>NOTE 5: Used URI scheme shall be SIP URI. The Reason "headers" component with a cause parameter cannot be added if hi-targeted-to-uri is a tel URI.</p> <p>NOTE 6: The used URI scheme can be tel or SIP since the last hi-targeted-to-uri entry of the History-Info header field does not contain the Reason "headers" component with a cause parameter.</p> <p>NOTE 7: The hi-target-param defined in IETF RFC 7044 [91] defines the mp-param "mp" as a header field parameter that contains the value of the hi-index in the hi-entry with an hi-targeted-to-uri that reflects the Request-URI that was retargeted, thus identifying the "mapped from" target. Since the hi-entries are created based on the redirection counter to reflect the diverting/diverted-to entries, the hi-target-param "mp" shall be present in each entry except the first one.</p> <p>NOTE 8: If the Original called number parameter is not available and if the value of the Redirecting counter is equal to one, the Redirecting number parameter is used for the first hi-targeted-to-uri entry of the History-Info header field.</p> <p>NOTE 9: If a further SIP to ISUP interworking occurs, parameters not present in the original message can then be included.</p> <p>NOTE 10: The "History-Info" header field may contain an "Unknown User Identity". An "Unknown User Identity" includes information that does not point to the served user and indicates that the user's identity is unknown. The encoding of the "Unknown User Identity" shall be as defined in 3GPP TS 23.003 [74].</p>			

Source: 3GPP TS 29.163 - Table 7.4.6.2.3.1: Mapping of IAM to SIP INVITE request

**Parameters:**

- Mapping of **ISUP Calling Party Number** parameter to **SIP P-Asserted-Identity header:**

BICC/ISUP Parameter / field	Value	SIP component	Value
Calling Party Number		P-Asserted-Identity header field	addr-spec and optionally display-name (NOTE 1)
Nature of Address Indicator	"national (significant) number"	Tel URI or SIP URI (NOTE 2)	Add CC (of the country where the MGCF is located) to CgPN address signals to construct E.164 number in URI. Prefix number with "+".
	"international number"		Map complete CgPN address signals to E.164 number in URI. Prefix number with "+".
Address signal	If NOA is "national (significant) number" then the format of the address signals is: NDC + SN If NOA is "international number" then the format of the address signals is: CC + NDC + SN	Tel URI or SIP URI (NOTE 2)	CC+NDC+SN as E.164 number in URI. Prefix number with "+"
NOTE 1: The display-name may be mapped from the corresponding telephone number if possible and allowed by network operator policies.			
NOTE 2: A tel URI or a SIP URI with "user=phone" is used according to operator policy.			

Source: 3GPP TS 29.163 - Table 14: Mapping of calling party number parameter to SIP P-Asserted-Identity header fields

- Mapping of **ISUP Called Party Number** to **SIP Request-URI** and **SIP To header:**

IAM		INVITE	
BICC/ISUP Parameter / field	Value	SIP component	Value
Called Party Number		Request-URI and To header field	addr-spec derived from Called Party Number parameter address signals
Nature of Address Indicator	"national (significant) number"	Tel URI or SIP URI with "user=phone"	Insert "+351" before the Address signals

Source: 3GPP TS 29.163 - Table 10a: Mapping ISUP Called Party Number to SIP Request-URI and To header field

Alternatively, the Diversion header may be used to carry the location information, following the mapping indicated in RFC 5806:

<b>'ISUP Redirecting Number'</b>
The ISUP Redirecting Number SHOULD be used to set the value of the name-addr of the top-most Diversion header. The ISUP Redirecting Number address presentation SHOULD be used to set the value of the diversion-privacy of the top-most Diversion header. The ISUP Redirecting Reason SHOULD be used to set the value of the diversion-reason of the top-most Diversion header.
<b>'Original Called Number'</b>
When present, the Original Called Number SHOULD be used to set the name-addr of the bottom-most Diversion header. When present, the Original Redirecting Reason SHOULD be used to set the diversion-reason of the bottom-most Diversion header. When present, the Original Address Presentation SHOULD be used to set the diversion-privacy of the bottom-most Diversion header.
<b>'ISUP Redirection Information'</b>
The Redirection Counter value minus 1 SHOULD be stored in the diversion-counter associated with the top-most Diversion header. Presence of the diversion-counter for the bottom-most Diversion header is optional. If present, the diversion-counter of the bottom-most Diversion header SHOULD be 1.

## **Specificities associated to 112 eCalls - manual and automated**

When transferring eCall emergency calls to IP interconnection, the same mapping identified above for mobile 112 calls should be guaranteed (in compliance with 3GPP TS 29.163 or RFC 5806 standard).