

IPWorks 3GPP AAA Server-HLR J' Interface

INTERWORK DESCRIPTION

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1 Introduction

This document describes the J' interface between the IPWorks AAA Server node and the Home Location Register (HLR) node.

Scope

This document covers the following topics:

- Interface Overview
- Services
- Procedures
- Information Model
- Formal Syntax or Schema

Target Groups

This document is intended for personnel needing to understand the logical entity, including interfaces and protocols, of the IPWorks.

1.1 Prerequisites

N/A

1.2 Related Information

Trademark information, typographic conventions, definition and explanation of acronyms and terminology can be found in the following documents:

- *Trademark Information*, Reference [1]
- *Glossary of Terms and Acronyms*, Reference [2]
- *Typographic Conventions*, Reference [3]





2 Interface Overview

This section describes the J' interface between the IPWorks AAA Server node and the HLR node as shown in Figure 1. The J' interface uses the MAP version 3 protocol for retrieving the subscriber location and subscriber state.

The standard MAP version 3 ANY TIME INTERROGATION (ATI) operation is used by IPWorks AAA server to interrogate the HLR to retrieve location information for a subscriber. The interworking between HLR, MSC/VLR, SGSN, and MS is outside the scope of this document.

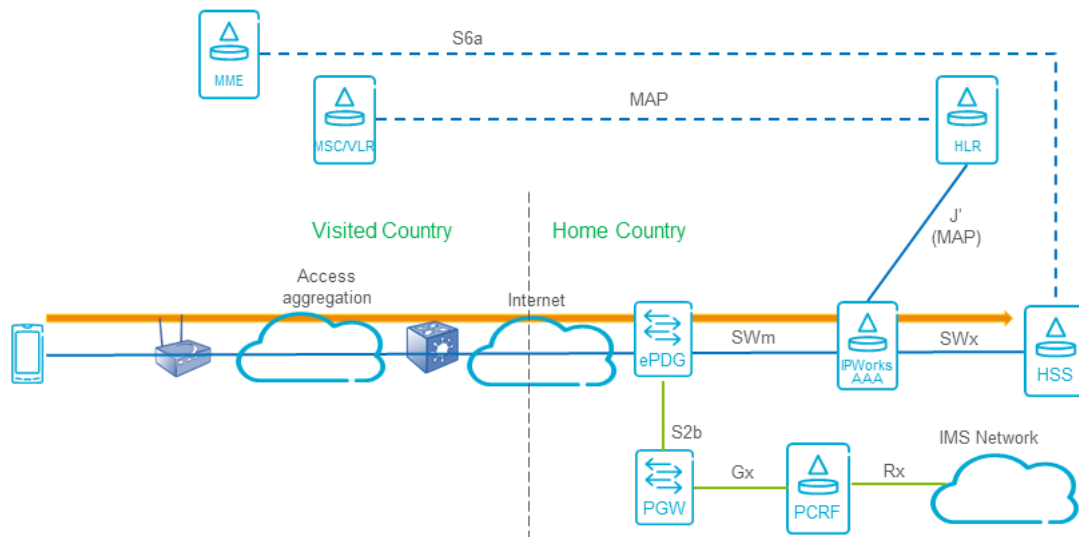


Figure 1 J' Interface

2.1 Interface Role

The J' interface uses the MAP version 3 protocol to retrieve the subscriber location and subscriber state information from HLR. IPWorks AAA server simulates the role of gsmSCF defined in chapter 11 *Subscriber Location and State retrieval* in 3GPP TS 23.078.

2.2 Services

The user service used by the HLR is shown in Table 1

*Table 1 Used Service*

Used Service	Description
CAMEL_ATI_HLR	This service is used between the IPWorks AAA server and the HLR to retrieve the location information. IPWorks AAA server triggers the service request upon receiving the authentication request from SWm, and the retrieved location information is used by IPWorks AAA server to compose the <code>Visited_Network_Id</code> .

2.3 Encapsulation and Addressing

IPWorks AAA server supports standard MAP version 3 protocol for accessing the HLR data. The MAP version 3 ANY TIME INTERROGATION (ATI) operation is transported over TCAP. 3GPP TS 29.002 defines how the MAP operation uses TCAP and lower layers of Signalling System No.7 (SS7).

For SCCP layer routing, both Signaling Point Code (SPC) + Subsystem Number (SSN) and Global Title Translation (GTT) routing mechanisms are supported. If GTT routing is chosen, the TT default value is 0, but can be configured.

IPWorks AAA server supports SIGTRAN as the transport vehicle.



3 Procedures

This section describes the procedures used in connection with the used interfaces of IPWorks AAA server.

3.1 Overview

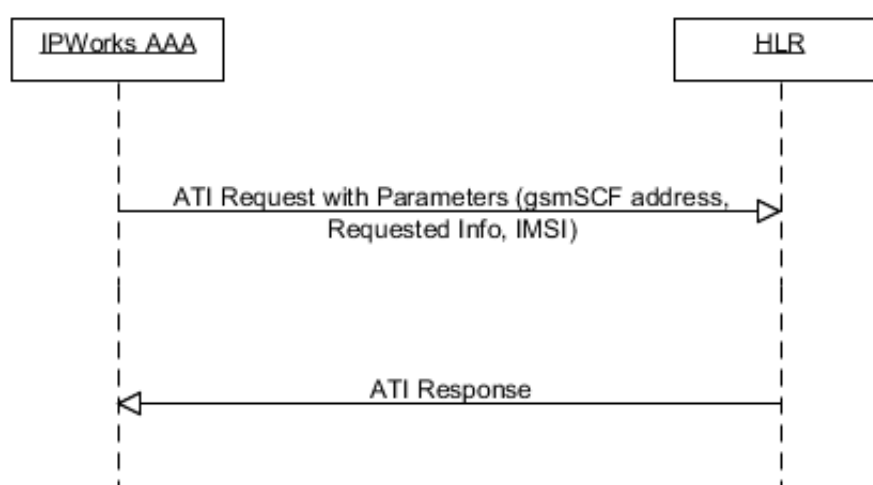


Figure 2 ATI Request and ATI Response

The ATI Response could be `ATI Ack` or some ATI negative responses. In some cases, IPWorks AAA server cannot get any response and a preset timer expires.

3.2 Lower Level Procedures

N/A

3.3 Any Time Interrogation

The IPWorks AAA server obtains the subscriber state and location information by sending Any Time Interrogation request to HLR.

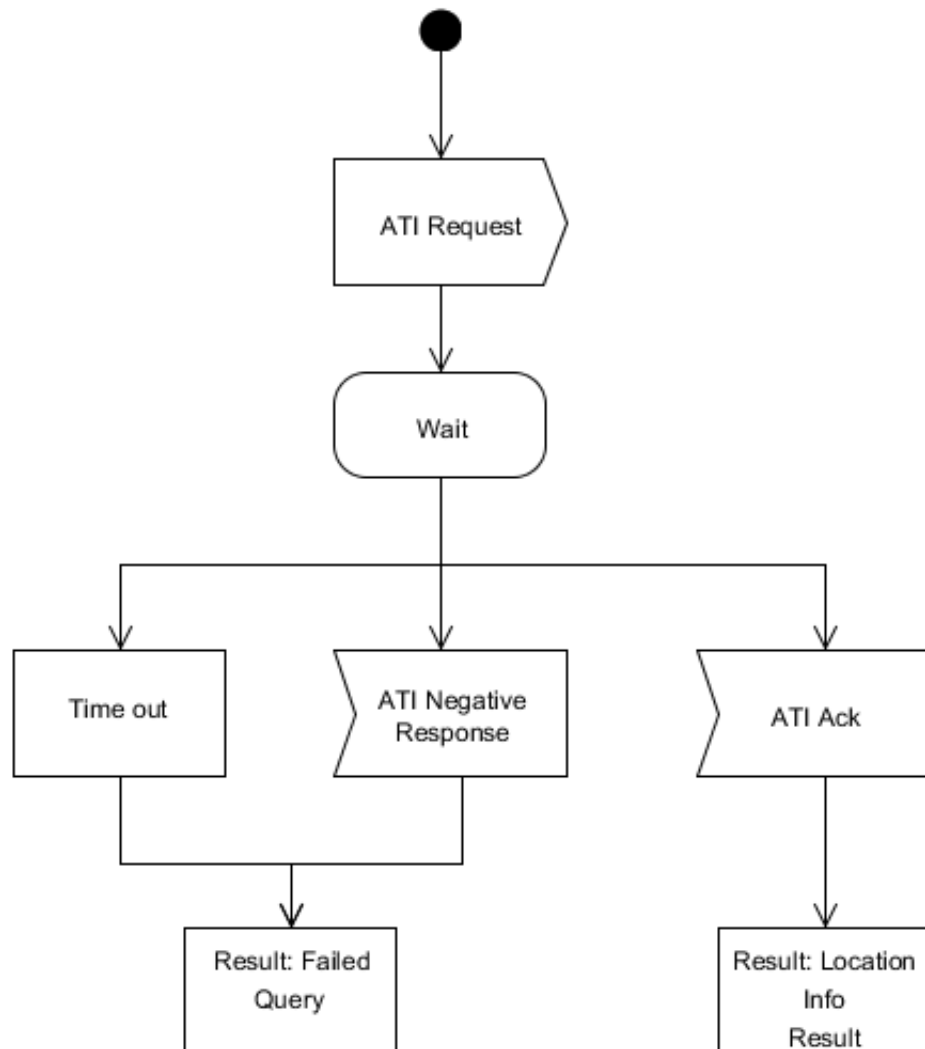


Figure 3 ATI Handling Procedure

3.3.1 ATI Request

IPWorks AAA server triggers ATI request operation towards the external HLR upon receiving the authentication request from SWm interface and CS Location lookup is required for the authentication.

3.3.2 Wait

The default waiting timer value is 3 seconds, which can be configured. Operator can adjust it according to the real network condition.



3.3.3 ATI Ack

IPWorks AAA server receives the ATI Ack message if HLR provides the requested Location Information for the subscriber.

3.3.4 ATI Negative Response

If HLR does not know the Location Information of the requested subscriber `Unknown subscriber`, or does not provide the ATI service `ATI Not Allowed`, IPWorks AAA server receives the ATI Negative Response.

3.3.5 Time Out

After waiting for the configured time length without receiving response from HLR, the timer expires.

3.3.6 Result: Location Info Result

The subscriber Location Information contained in the ATI Ack is used by IPWorks AAA server for further internal function processing. This is the end of MAP ATI operation for this subscriber number.

3.3.7 Result: Failed Query

IPWorks AAA server also takes this information as input to proceed with other function processing. No further MAP ATI operation is done for the specific subscriber number.





4 Information Model

Each Information Element (IE) is marked as M, C, S, E, or -.

Table 2 Element Description

M	Mandatory	An “M” IE must always be included.
C	Conditional	A “C” IE must be included if the sending entity has the necessary information to populate the IE.
S	Specific conditions	The conditions for the inclusion of an “S” IE are shown in the “Description” column of the definition table.
E	Mutually Exclusive	When a set of “E” IEs is shown in the definition of an Information Flow or compound IE, only one of those IEs can be included.
o	Optional	
-	Not applicable	A “-” IE must always be omitted.

The following principle is applicable to the handling of the IEs by IPWorks AAA server:

- IPWorks AAA server discards any IEs that are not functionally supported by IPWorks AAA server.

4.1 Any Time Interrogation Request

This MAP operation is used by IPWorks AAA server to request the location information for subscribers from the HLR at any time. The information elements contained in MAP layer for location information are described as follows:

Table 3 Information Element for ATI Request

Information Element Name	Status	Description
Subscriber Identity	M	This IE identifies the subscriber for which the information is requested. The identity is IMSI.
Requested Info	M	This IE indicates the type of subscriber information being requested. This IE is described in Table 4.
gsmSCF Address	M	This IE indicates the address of the interrogating gsmSCF.

*Table 4 Requested Info*

Information Element Name	Status	Description
Location Information	O	This IE indicates that the Location Information is requested.
Subscriber State	O	This IE indicates that the Subscriber State is requested.
Current Location	O, S	This IE indicates that the Current Location is requested. This IE is not present if Location Information is not present in Requested Info.
Requested Domain	M	This IE indicates for which domain the subscriber info is requested. It is circuit switched domain.
IMEI (with software version)	O	This IE indicates that the IMEI (with software version) is requested.
MS class mark information for the requested domain	O	This IE indicates that the MS classmark information for the indicated domain is requested.

Requested Info contains one or more of the following information elements:

- Location Information
- Subscriber State
- IMEI (with software version)
- MS classmark information for the requested domain

IPWorks AAA server always selects Location Information and Subscriber State as the Requested Info.

4.2 Any Time Interrogation Ack

The ATI Ack is used by the HLR to provide the requested subscriber location or subscriber state information to the IPWorks AAA server.



Table 5 Information Element for ATI Ack

Information Element Name	Status	Description
Location Information	C, E1	This IE indicates the location of the served subscriber in the MSC/VLR. It is present only if requested by IPWorks AAA server.
Subscriber State	S, E2	<p>This IE indicates the state of the MS in the CS domain. It is present only if requested by IPWorks AAA server. The possible values of the IE are listed as follows:</p> <ul style="list-style-type: none"> • CAMELBusy: The VLR has indicated that the MS is engaged in a transaction for a mobile originating or terminated circuit-switched call. • NetworkDeterminedNotReachable: The HLR or VLR has indicated that the network determines from its internal data that the MS is not reachable. • AssumedIdle: The VLR has indicated that the state of the MS is neither “CAMELBusy” nor “NetworkDeterminedNotReachable”. • NotProvidedFromVLR: The VLR did not provide any information on subscriber state even though it was requested.

Location Information contains the following information:

Table 6 Location Information

Information Element Name	Status	Description
Age Of Location Information	C	The elapsed time in minutes since the last network contact of the mobile station.
Service area ID	C,E	See 3GPP TS 23.018.
Cell ID	C,E	See 3GPP TS 23.018.

Information Element Name	Status	Description
VLR Number	C	See 3GPP TS 23.018. The HLR includes the internally stored VLR Number. E.164 number which identifies the VLR, see 3GPP TS 23.003.
Location Number	C	See 3GPP TS 23.018.
Service area ID	C,E	See 3GPP TS 23.018.
Location area ID	C,E	See 3GPP TS 23.003.
Geographical information	C	See 3GPP TS 23.018.
Geodetic information	C	See 3GPP TS 23.018.
Current Location Retrieved	C	This IE is present when location information was obtained after a successful paging procedure for Active Location Retrieval.
Selected LSA Identity	C	The IE indicates the LSA identity associated with the current position of the MS. It is present if the LSA ID in the subscriber data matches the LSA ID of the current cell. In case of multiple matches, the LSA Id with the highest priority is present. See 3GPP TS 23.073.
MSC number	C	E.164 number which identifies the VMSC in whose area the subscriber is registered. See 3GPP TS 23.003. If the HLR receives the MSC number from the VLR in the Provide Subscriber Info Ack, then the HLR ignores the MSC number.

4.3 Any Time Interrogation Negative Response

There could be many types possible ATI negative response. IPWorks AAA server does not distinguish them and treat all the negative response as failed query.



5 Formal Syntax or Schema

Refer to 3GPP TS 29.002 for the interface used by MAP v3 ATI operation.





6 Related Standards

This interface is based on 3GPP TS 23.078 .

This interface does not fully comply with the whole specification:

- Only the gsmSCF interface in the chapter 11 *Subscriber Location and State retrieval* service is supported.
- IPWorks AAA server simulates the role of gsmSCF.
- For the information elements which are conditional parameters in ATI Ack, IPWorks AAA server treats all them as optional.





Reference List

IPWorks Library Documents

- [1] *Trademark Information*
- [2] *Glossary of Terms and Acronyms*
- [3] *Typographic Conventions*

Standards

- [4] [3GPP TS 23.003 Technical Specification Group Core Network and Terminals; Numbering, addressing and identification](#)
- [5] [3GPP TS 23.018 3rd Generation Partnership Project; Technical Specification Group Core Network and Terminals; Basic call handling; Technical realization](#)
- [6] [3GPP TS 23.073 3rd Generation Partnership Project; Technical Specification Group Core Network; Support of Localised Service Area \(SoLSA\)](#)
- [7] [3GPP TS 23.078 3rd Generation Partnership Project; Technical Specification Group Core Network; Customised Applications for Mobile network Enhanced Logic \(CAMEL\) Phase 4; Stage 2 \(Release 6\)](#)
- [8] [3GPP TS 29.002 3rd Generation Partnership Project; Technical Specification Group Core Network; Mobile Application Part \(MAP\) specification; Release 6](#)