3GPP TSG SA WG3 Security — S3#29 **S3-030431**
15 - 18 July 2003
San Francisco, USA

3GPP TSG-SA WG2 meeting #33 **Tdoc S2-032737**
Sophia Antipolis, 07th – 11th July 2003

Title: Liaison on SIP signalling interworking
Response to: S2-032317 = N3-030461
Release: Rel-6
Work Item: IMS-2

Source: SA2
To: CN1, CN3, SA3, SA5
Cc:

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Attachments: S2-032548, S2-032564

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1. Overall Description:

SA2 thanks CN3 for the liaison statements on SIP signalling interworking between IM CN subsystem entities and SIP network entities external to the IM CN subsystem. In particular SA2 thanks CN3 and CN1 for their work on TR 29.962.

SA2#33 discussed the architectural impacts of the two proposed solutions and concluded that

- the solution based on a B2BUA as a signalling interworking function should no longer be pursued;
- 3GPP adopts the so-called end-to-end modified flow as the basis for SIP interworking.

The motivation for this decision is described in the two attached contributions.

SA2 intends to provide the necessary updates to TS 23.228 at the next meeting(s).

2. Actions:

To CN1, CN3, SA3, SA5:
SA2 kindly asks the above groups to note the decision and to perform the necessary work once SA2 has approved CRs to TS 23.228.

3. Date of Next SA2 Meetings:

SA2#34	18-22 August 2003	Brussels, Belgium
SA2#35	27-31 October 2003	Asia

3GPP TSG-SA2 Meeting #33 ***S2-032548***
7-11 July 2003, Sophia Antipolis, France

Source: **Siemens AG**

Title: **SIP Signalling Interworking**

Agenda item: **9.2 (IMS Phase 2), also related to 5**

Document for: **Discussion**

Introduction

3GPP CN3 have completed TR 29.962 " Signalling interworking between the 3GPP profile of the Session Initiation Protocol (SIP) and non-3GPP SIP usage", which was approved at CN#20. In their liaison statement S2-032317 (= N3-030461), CN3 ask SA2 to study the architectural impact of the solutions studied in the TR. This contribution discusses some architectural aspects and the way forward.

Background Information

Communication within the IMS relies on the SIP "preconditions" extension as defined in RFC 3312 and related SIP extensions. They are mandated in the IMS, in particular to support service based local policy and charging. External SIP clients do not necessarily support these SIP extensions.
CN3 has studied the resulting interworking issues. Two possible solutions have been investigated:

1. Insert a "back to back user agent" as signalling interworking function.
2. Allow modified call flows that use the "inactive" SDP attribute within the IMS and adopt the rules for service based local policy.

Discussion

In approach 1 a back-to-back user agent is introduced as a signalling interworking function. While this has the advantages of concentrating the desired functionality in one functional entity, there are a number of key disadvantages: It is unclear when and how such an interworking function would be invoked. More important is the fact that an interworking function breaks the end-to-end paradigm of SIP, and would probably become the source of another round of irritations between 3GPP and IETF. The (non-binding, but clear) recommendation of the 3GPP/IETF workshop in San Francisco in January 2003 has been: "All user agents including 3GPP user agents should be able to fall back to baseline capability when an extension negotiation failure occurs".
The second approach follows this guideline while preserving the possibility to apply important IMS capabilities. If an external client does not support the required SIP extensions, then a session with this client is first established with "inactive" media. The media stream is then activated by the UE with a RE-INVITE once the local resource reservation has been completed. If SBLP is used, the gate is opened and charging applied once the media are set active. The SIP-level message exchange to activate the media also provides a means for the transfer of the GPRS charging identifier for charging correlation after this identifier becomes available at the PDF.
From an architectural perspective, the disadvantage of this approach is that it might impact a number of functional entities, although the anticipated impacts appear to be small: the UE, the P-CSCF/PDF, and the S-CSCF need to be able to cope with the modified call flows and e.g. be able to receive the Charging Identifiers at different points in time. Also, "overloading" the meaning of the "inactive" attribute for SBLP and charging might result in undesired side effects if not done carefully. CN groups should ensure from the beginning that the solution is acceptable from an IETF perspective.
Both proposed solutions are not capable to avoid negative impacts on the user experience, e.g. a user being alerted before the required resources are available and consequently clipping. The IETF designed the “preconditions” extension to solve those issues, and the usage of the preconditions extension therefore remains preferable where ever possible, in particular for real-time services.

Proposed Way Forward

As discussed above the specification of a "back-to-back UA interworking function" would break IETF paradigms and might harm the 3GPP-IETF relationship. Therefore it is recommended that this approach be no longer pursued. Thus SA2 should encourage CN1 and CN3 to base their specification work on the "inactive" approach. The response liaison should include the comments above.
Concerning SA2 documentation, it is recommended that 23.228 covers interworking with external SIP clients, which do not support all SIP extensions mandated for 3GPP SIP clients. For example, this would mean to introduce a short new sub-clause in clause 4 of TS 23.228 and an example call flow in

clause 5 or a normative annex. If the proposal is agreed in principle, then Siemens will be glad to provide the necessary CR to TS 23.228.

3GPP TSG-SA2 Meeting #33 ***Tdoc S2-032564***
Sophia Antipolis, France, 7-11 July 2003

Source:	Ericsson, Nokia
Title:	SIP interworking proposal
Agenda item:	9.2 IMS phase 2
Document for:	Discussion and approval

Introduction

CN #20 approved the Technical Report 29.962: "Signalling interworking between the 3GPP profile of the Session Initiation Protocol (SIP) and non-3GPP SIP usage".

The report is received by SA2 together with an LS S2-032317 from CN3 asking for guidance and architectural decisions.

Discussion

CN3 has produced the technical Report 29.962: "Signalling interworking between the 3GPP profile of the Session Initiation Protocol (SIP) and non-3GPP SIP usage". The report discusses the problems of interworking between SIP implementations that conform to the 3GPP stage 3 profile (defined in 3GPP TS 24.229) and regular off-the-shelf SIP implementations that do not implement all the 3GPP mandated extensions for SIP.

The Technical report analyzes two opposed proposals to solve the mentioned interworking case:

a) A solution based on placing an intermediary in the signalling path, namely a Back-To-Back-User-Agent (B2BUA). The B2BUA will make the 3GPP UE believe that all the required capabilities are supported at the remote party, and will initiate a session towards a remote party without requiring extra capabilities.

b) A solution based on a modified end-to-end call flow. This solution proposes that the UE, upon receiving an indication of unsupported capabilities at the remote party, will relax its requirements for those unsupported SIP capabilities. It must be noticed that SIP provides all the building blocks to discover the supported and unsupported capabilities of the remote party.

Even though neither approaches described in the TR provide a perfect interworking solution, the main goal of this work is to provide higher success rate of session completion without adversely affecting the IMS service goals and requirements.

Analysis of the proposals

The mechanism based on the insertion of the B2BUA provides the following characteristics:

1. The B2BUA **breaks the service transparency** design goal of IMS. The B2BUA is required to understand all the SIP and SDP headers, parameters and extensions. If a new extension is developed, the B2BUA has to be upgraded to understand such extension, otherwise interworking will fail.
2. As the report has documented, implementation of a **B2BUA becomes complicated**, because of the large number of use cases to be supported. It seems complicated to represent in a deterministic way the B2BUA functionality.
3. The B2BUA needs to understand, **store and keep track of the SDP** of both parties.
4. The B2BUA needs to keep **different SIP timer supervision** on the 3GPP leg and on the non-3GPP leg.
5. As the B2BUA solution requires inserting a new node in the signalling path, **it increases the session setup time**. Of course the B2BUA could be collocated with other node (e.g., S-CSCF). However, it is not defined how to make a transition between S-CSCF proxy functionality to B2BUA, and due to the complexity to create a deterministic behaviour of the B2BUA, this option seems quite unrealistic.
6. The TR didn't find a solution as for when to dynamically insert a B2BUA. The proposed solution is to insert the B2BUA in the signalling path for all communications. This solution has the disadvantage that it will have a **penalty in the session setup time, even for those sessions that do not require any SIP interworkin**g.
7. The solution does not affect interoperability towards Release 5. Consequently, **it does not require standardisation** of the B2BUA. Any operator may insert, at his own discretion a B2BUA considering all the

consequences of having such entity in the path of the call, without requiring the standards to mandate such behaviour.

8. The solution **breaks the IETF principles**, especially the end-to-end model and the security model.

The mechanism based on the modified end-to-end call flow provides the following characteristics:

1. It **does not break service transparency,** because it does not require insertion of a new node that needs to understand all the SIP headers and parameters, SDP, etc.
2. **Implementation is simple.** In the UE it just requires to follow SIP (RFC 3261) in case a session is not proceeding because of an unsupported SIP extension. That is, the UE should re-attempt the session without mandating support of the SIP extension requirement.
3. The solution has **no new setup delay times** due to a new node in the signalling path. However, the solution introduces one more end-to-end roundtrip, adding therefore, a delay in the session setup in cases where there is interworking needed. Although this may seem at the first glance a drawback, it is a better compromise than the B2BUA solution.
    a. First, unlike the B2BUA solution, it only affects those sessions that require SIP interworking.
    b. Secondly, because the UE receives an indication of the unsupported capabilities of the remote end, the UE can display a progress message to the user, so that the user is informed "**session setup is progressing".**
4. The solution **requires minimum standardisation** of the UE behaviour
5. It complies with standard SIP implementation, as well as allows addition of SIP extensions based on what the User Agents can support, and not what an intermediate node can recognise and understand.

Problem Scenarios

The following example flows show the 2 problem scenarios, i.e. originating and terminating session initiation between a 3GPP UA and a non 3GPP UA.

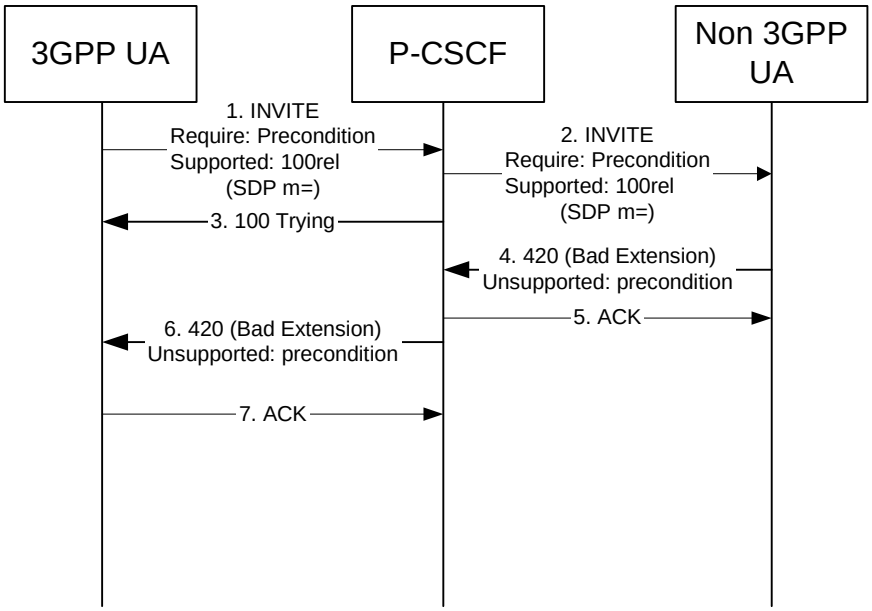

Figure 1. Originating session detection, other SIP end does not support 3GPP headers

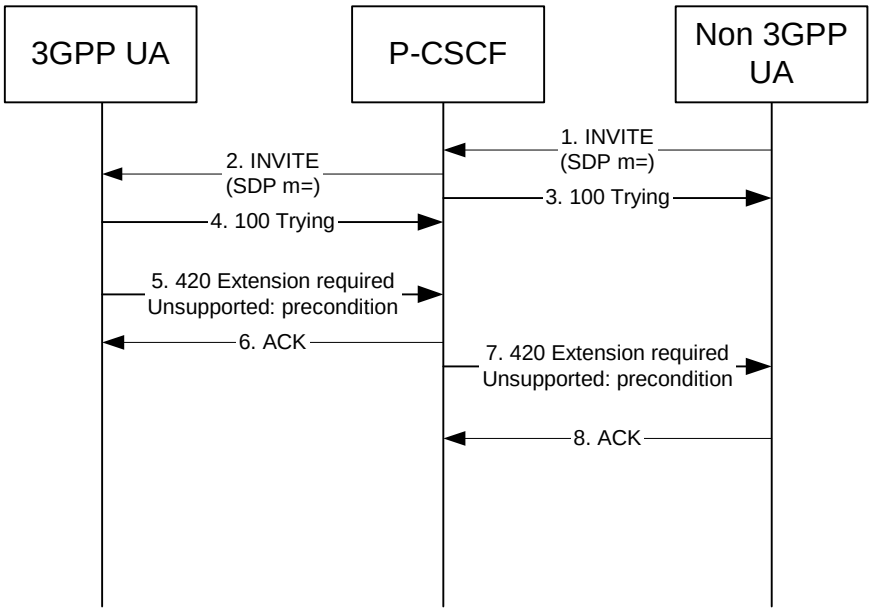

Figure 2. Terminating session detection, other SIP end does not support 3GPP headers

End-to-end call flow solutions

The following flows show how an end-to-end session flow would be accomplished to resolve the problems described above. As noted, the current Release 5 architecture & network elements provide all the mechanism to support the sessions accordingly.

Originating session

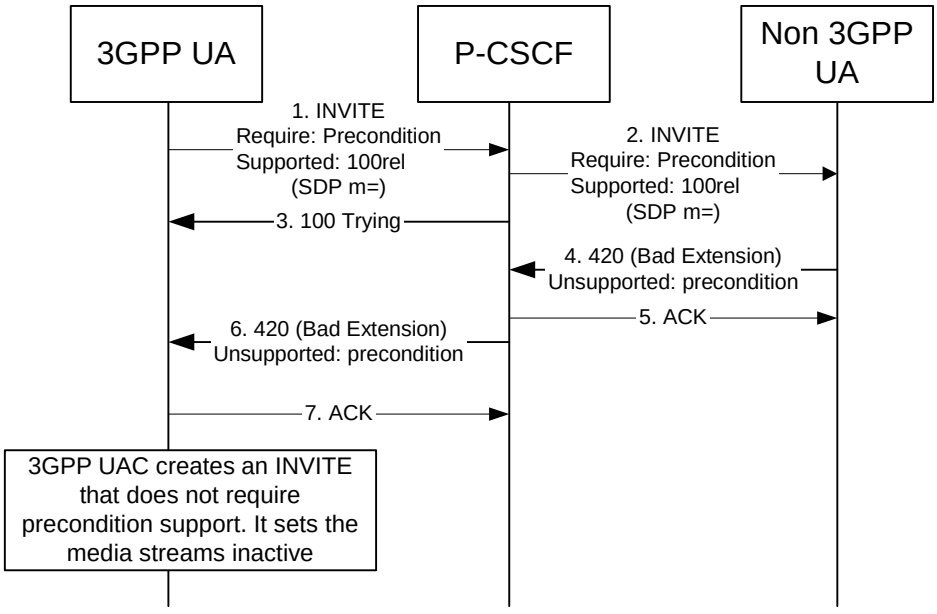

Figure 3. Originating session, other SIP end does not support 3GPP headers, detection phase

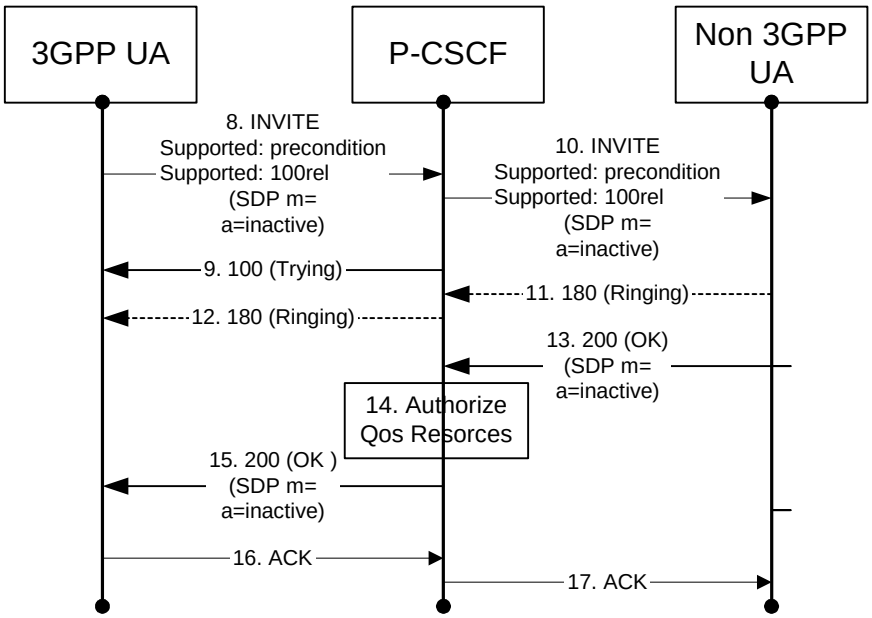

Figure 4a. Originating session, other SIP end does not support 3GPP headers, re-initiate session setup

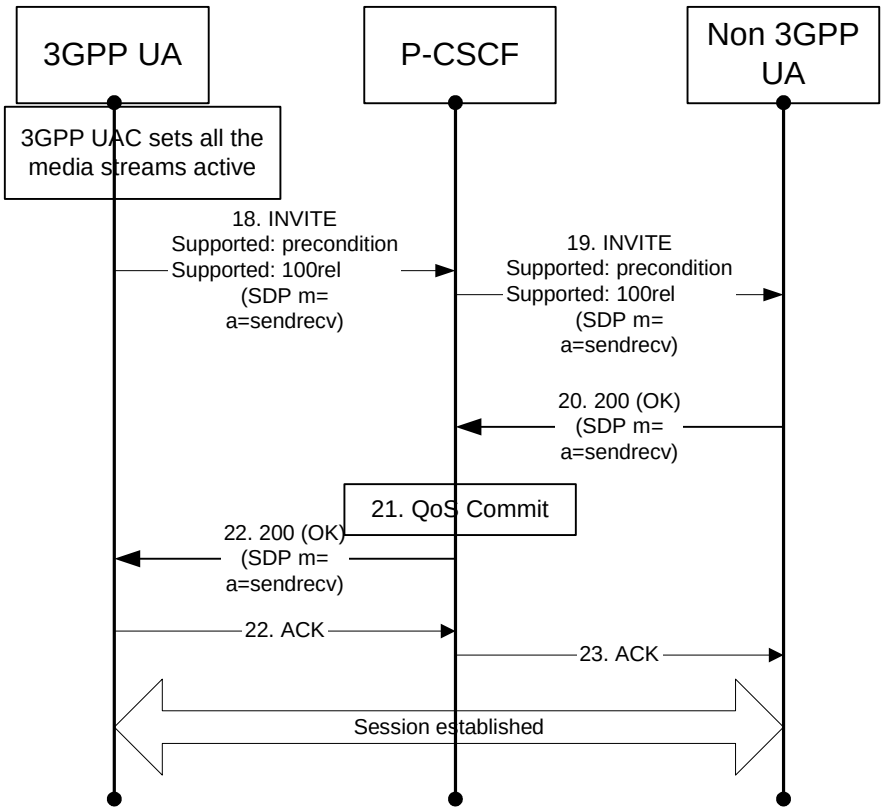

Figure 4b. Originating session, other SIP end does not support 3GPP headers, re-initiate session setup

Terminating session

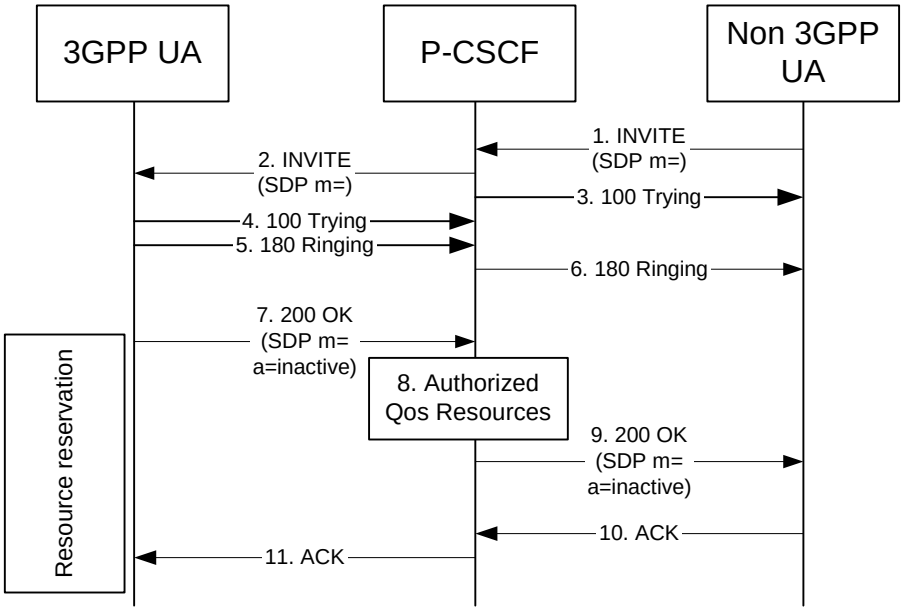

Figure 5. Terminating session, other SIP end does not support 3GPP headers, detection phase

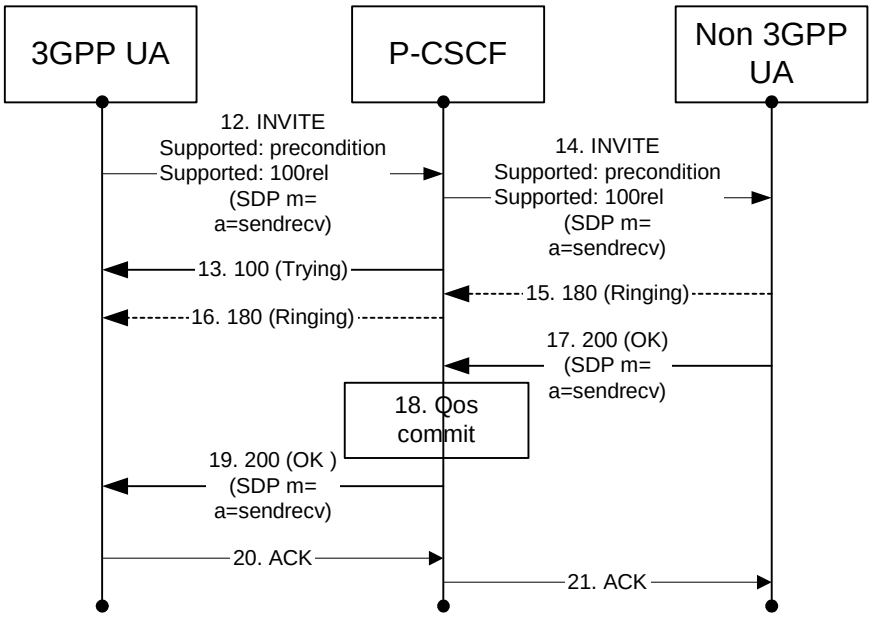

Figure 6. Terminating session, other SIP end does not support 3GPP headers, re-initiate session setup

Proposal

Considering all the mention advantages and disadvantages of both solutions, it is proposed that:

1. 3GPP adopts the so-called end-to-end modified flow as the basis for SIP interworking, as shown above via session flows.
2. SA2 sends LS to CN3, CN1, SA3 & SA5, so that the necessary CRs are issued to the relevant specifications in order to provide a solution based on the end-to-end modified flow.

In addition, SA2 should also consider the architecture and interoperability with Release 5 and possibly check the feasibility of the following:

1. Not to endanger the deployment of Rel-5 terminals, the end-to-end modified flow solution should be a strong recommendation for Rel-5 terminals, inline with RFC 3261.