PROJECT: T1P1 Activity on Lawful Intercept for UMTS

TITLE: **Packet Activity Reporting:** Examples for how suppliers might support the Packet Activity Reporting capability as part of LAES for GPRS Packet Domain.

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ABSTRACT: This contribution provides three examples detailing how suppliers could implement support of the Packet Activity reporting capability while minimizing the performance impacts on the SGSN or GGSN.

DISTRIBUTION: T1P1.SAH

NOTICE

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A. Introduction

Similar to wireline systems, wireless systems establish a communication path across the accessing system from the subject's device to a network before communication between a subject and an associate can begin. Currently, the establishment or release of this communication path is reported via the BEGIN and END Intercept-Related Information (IRI) records, respectively. These IRI records identify when an intercept subject has established or ended the ability to communicate over a communication path. After a communication path is established by a wireless accessing system between the subject device(s) and the network, the interception subject can communicate directly with an associate over the connecting path.

Packet activity detection and IRI reporting is a mechanism for identifying the IRI associated with packets sent by or to the interception subject. Currently TS 33.107 and 33.108 do not support such a capability. In general, there are two general forms of interception orders, one which entitles LEAs to receive IRI and another that entitles the receipt of both IRI and communication content. In performing IRI type interception, one of the key pieces of information is the identification of the communicating parties. Right now TS 33.108 will not provide this information (it will only report that a PDP context has been setup or not and the endpoint of the PDP context). It will not identify the IRI for the communicating parties of the packets being exchanged.

When delivery of only IRI is authorized and in the absence of packet activity detection and IRI reporting, LEAs will be missing critical information to which they are entitled. The omission from TS 33.107 and TS 33.108 of any capability for reporting IRI associated with packets (e.g., IP addresses, protocol, port numbers) sent or received by the interception subject (either on a per-packet or on an aggregate basis) fails to meet law enforcement’s legitimate needs for acquiring lawfully authorized information.

At the 3GPP S3 LI meeting held in April 2002, it was agreed that TS 33.108 did not currently address the concept of Packet Activity Detection and IRI reporting and that contributions on this topic were welcome to future meetings. Industry participants (carriers and manufacturers) raised concerns related to the possible performance impacts of the Packet Activity Detection and IRI reporting function. These concerns had also been raised at the T1P1.SAH meeting held in January 2002.

This contribution provides several examples for how suppliers could support the Packet Activity Detection and IRI reporting capability for the GPRS Packet domain while minimizing the possibility of performance impacts on the SGSN or GGSN. Note that these are only examples, and should not be construed to be a mandate of any design or implementation.

B. Discussion

B.1 Definitions

Packet Activity Detection and IRI Reporting (PAD-IR) is the ability to detect packets sent by or to the interception subject and deliver IRI associated with those packets to LEA.

PAD-IR requires the ability to perform packet activity detection (i.e., the ability to detect packets sent by or to the interception subject). The ability to detect packets sent by or to the interception subject is a capability that is supported already in TS 33.107 and TS 33.108 for meeting the need of the HI3 interface. Thus, PAD-IR builds on top of an already supported capability. The additional aspect being introduced is the post interception processing to generate the IRI associated with the intercepted packets.

B.2 Background

Fundamentally, packet activity detection is not a new concept for TS 33.107 and TS 33.108 as it is a required capability for the support of CC (as described above). **PAD-IR** builds upon the already supported packet activity detection capability by extracting IRI from the detected/intercepted packets to be reported to LEA.

LEAs need the delivery of IRI for the parties to a communication to ascertain origin, direction, destination, or termination information for each communication generated or received by the intercept subject. LEAs recognize that this information might be redundant with information delivered over the HI3 if a content interception order is in effect. LEAs need the delivery of IRI for packet activity regardless of whether the transmission is successful. That is, delivery of IRI is needed for packets sent by the intercept subject regardless of whether the transmission is successful to the intended destination. Similarly, delivery of IRI is needed for packets received by the intercepting system destined for delivery to the intercept subject regardless of whether the transmission is successful to the intercept subject MS.

LEAs need the following specific information to be reported separately from the content of communication to appropriately identify the parties and nature of the communication in association with an access path (i.e., PDP Context path):

a) Access Path ID (which correlates Network Address Information to Access Path events such as PDP Context Activation and Deactivation);

b) Transport Layer Protocol Identified in the packet;

c) Source and Destination Addresses of the packet;

d) Source and destination transport layer port of the packet.

B.3 Packet Activity Detection and IRI Reporting (PAD-IR) Process

The current LI specifications in 3GPP do not include a mechanism to support Packet Activity Detection and IRI reporting capabilities. If the process that could be used for supporting **PAD-IR** capabilities is examined, it could be decomposed into several functions. The following list provides an example of how the process can be decomposed, although there could be other ways to decompose this process:

1. Identification of Packets for which PAD-IR is to be performed (i.e., packet activity detection capability);
2. Processing each individual packet to extract the associated IRI;
3. Formulating the IRI record for reporting Packet Activity;
4. Transmitting the IRI record to the LEMF.

Figure 1 illustrates the above process relative to a “traditional” xGSN LI operation.

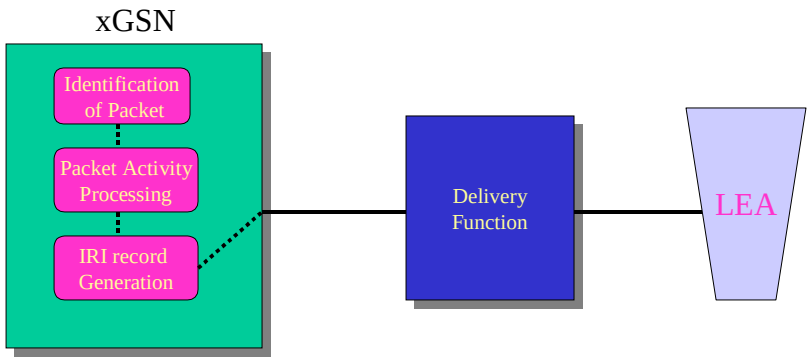

Figure 1 - Expected Function of xGSN for Packet Activity

In **Figure 1**, the identification of packets (i.e., the packet activity detection capability) is intended to address that process/function within the "traditional" xGSN that identifies the packets sent by or to the intercept subject. The **PAD-IR** function takes the identified packets and extracts the intercept related information for those individual packets (i.e., Source and Destination Addresses of the packet, Transport Protocol, and Source and Destination Transport Port of the packet). The IRI record generation function is responsible for generating a **PAD-IR** record to be sent to the Delivery Function (DF) based on the information obtained from each individual packet. If it is preferred to minimize signaling traffic, the IRI information related to a series of packets could be aggregated and sent in an aggregate **PAD-IR** record. The illustration in **Figure 1** is only an example and is not intended to imply a particular implementation.

B.4 Alternatives for Supporting PAD-IR Capability

If having all of these functions and processes within a "traditional" xGSN is "performance impacting" for some suppliers, then alternate arrangements can be used to provide the same functionality. Three alternatives are illustrated in this contribution (Dedicated resource, xGSN adjunct, and standalone device) that fit within the **existing model** provided by 3GPP TS 33.106, 107, and 108 in the context of the capabilities of a mediation function (MF).

In all of the alternatives illustrated in this contribution (See **Figure 2, Figure 3, and Figure 4**), the identification of packet function resides in the traditional xGSN while the other aspects of **PAD-IR** processing are moved to a different location or are provided via additional resources. Please note that the Logical xGSN is the combination of the "traditional" xGSN and the adjunct node. The DF only sees the Logical xGSN. From the perspective of the DF and LEMF this arrangement can deliver what is needed and does not alter their view of a xGSN. That is, the DF and LEMF do not see a difference between the Logical xGSN and the "traditional" xGSN.

Figure 2 demonstrates how the Packet Activity reporting capability could be supported if the xGSN is able to use dedicated resources provided just for the packet activity processing and IRI record generation. With dedicated resources available to support this capability, the "traditional" xGSN would not have to allocate much of the "normal" core functioning resources to the task of packet activity processing and reporting. The "traditional" xGSN would need to allocate some resources for the Identification of individual packets function, however, this is not expected to be great burden for the "traditional" xGSN as it would need to be supported for delivery of content of communication.

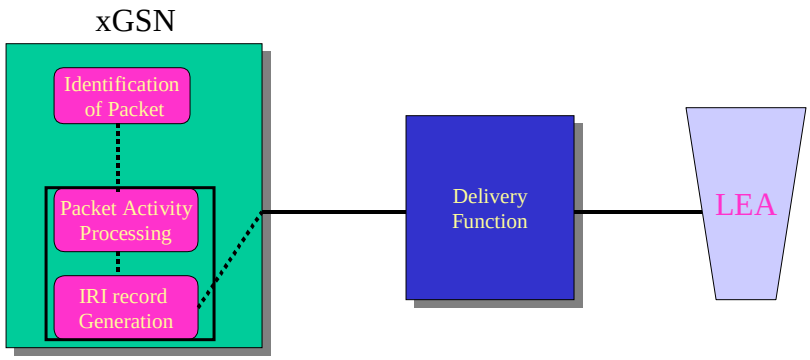

Figure 2 - xGSN with Dedicated Resources for Packet Activity Reporting

Figure 3 demonstrates how the Packet Activity reporting capability could be handled by an adjunct node to the "traditional" xGSN. As before, the identification of individual packets function is resident in the "traditional" xGSN. However, the Packet Activity processing and the IRI record generation functions are moved to an adjunct node. This alternative should also not have performance impacts on the "traditional" xGSN. The Logical xGSN is the combination of the "traditional" xGSN and the adjunct node. The DF only sees the Logical xGSN. From the perspective of the DF and LEMF this arrangement can deliver what is needed and does not alter their view of a xGSN. That is, the DF and LEMF do not see a difference between the Logical xGSN and the "traditional" xGSN.

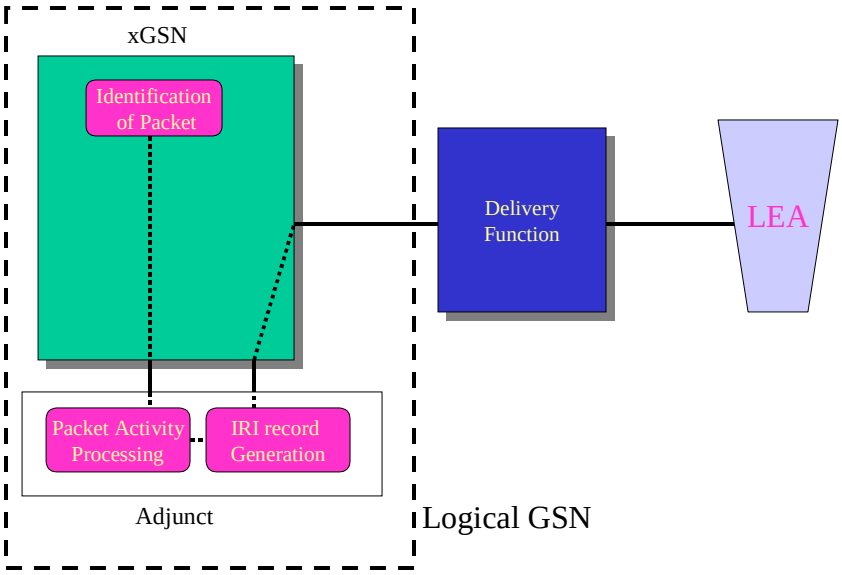

Figure 3 - Logical xGSN including Adjunct

Figure 4 illustrates the stand-alone packet activity reporting alternative. In this arrangement, the "Traditional" xGSN again, includes the identification of individual packets function. The "traditional" xGSN passes the identified packets to the stand-alone device for handling these packets. The stand-alone device processes these packets, extracts the relevant IRI, formulates the appropriate IRI record (aggregate or individual) and sends the IRI record(s) to the DF for transmission to the LEMF.

Similar to the alternative using an adjunct node, the DF and the LEMF do not see any difference between a "traditional" xGSN and the Logical xGSN.

This approach has the ability to allow the stand-alone device to service multiple "traditional" xGSNs. However, the stand-alone device could be conceptualized in such a way that the DF only views individual Logical xGSNs.

A whole new approach, not described in this contribution, but certainly possible is for the DF to view the stand-alone device as another network element to try to gain more efficiencies at the stand-alone device to DF interface.

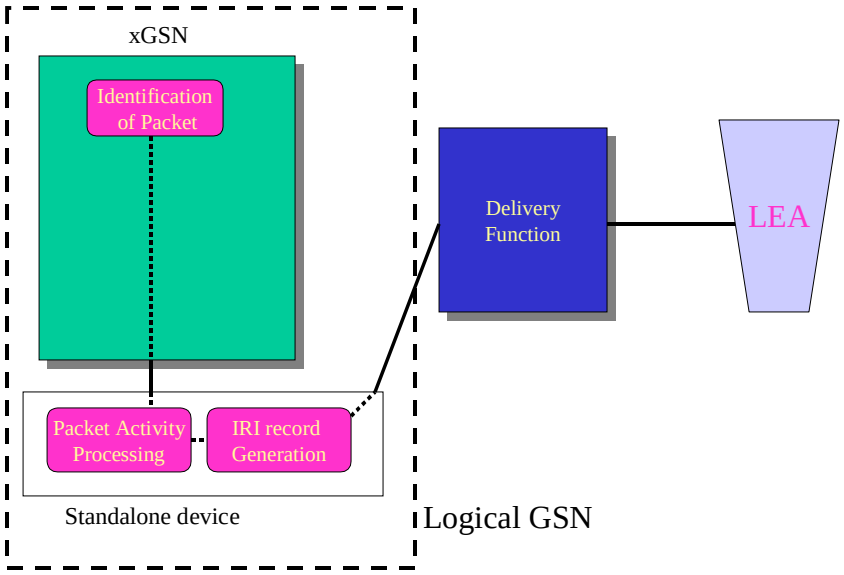

Figure 4 - Logical xGSN including Standalone Device

B.5 Summary

This contribution has provided three separate examples of how one could implement **PAD-IR** capabilities taking into consideration the impacts on performance on the xGSN with respect to its core functions while still meeting the needs of LEA.

In all of the example models provided for supporting the **PAD-IR** capability, the greatest burden placed on the "traditional" xGSN (core functioning of the "traditional" xGSN) is that of identifying the intercept subject's packets and handing those off to the Packet Activity processing function whether that Packet Activity processing function is in the same physical node as the "traditional" xGSN or in a separate physical node. This Identification of packet capability (i.e., packet activity detection capability) is required to be supported today at the "traditional" xGSN to support the interception of the content of communications.

As demonstrated by this contribution, alternative implementations are possible to address concerns about the impacts on performance on the core functions of the "traditional" xGSN. Various members of the industry are considering some of the examples shown in this contribution for implementation. All of these examples fit within the **existing model** provided by 3GPP TS 33.106, 107, and 108 in the context of the capabilities of an MF.

C. Recommendations

1. The examples provided in this contribution should be adopted for inclusion as an informative annex to TS 33.107 and TS 33.108.
2. T1P1.SAH (in conjunction with 3GPP) should move forward to develop requirements for extracting IRI associated with Packet Activity and transmitting the IRI to LEA.
3. Review, adopt, and forward to 3GPP S3 LI specific proposed changes to TS 33.107 and TS 33.108, respectively, to address **PAD-IR** reporting.