

Agenda Item: 6.7
Source: Motorola
Title: Call Trace
Document for: Decision

1 Introduction

The purpose of this paper is to introduce the Call Trace procedure to the Iub and Iur interface. This paper also introduces a mechanism to deactivate a trace via the Iu interface. Call Trace is a mechanism used to collect and analyse data about a specific UE context or set of UE contexts. This data can be used for network optimisation, fault management, or security. Although most of the data relating to a call can be collected by an RNC, there is data at the Node B that would provide valuable information. One example is, when attempting to isolate a fault in the node B, the physical resources involved in the call can be retrieved from the node B where the RNC would only have the logical resources.

The impact to the Iub and Iur interfaces does not include data collection and transfer. Call trace data is collected by the NE's and should be forwarded to the NE's management system. The management system then determines how the data will be consolidated for purposes of analysis. The performance of the Iub and Iur interfaces should not be degraded because of call trace data collection and transfer.

A call trace could be triggered in either the RNC or the Node B. The criterion used by each NE to trigger a trace is an issue for the NE and the corresponding management system and is therefore beyond the scope of this paper. The impacts to the Iub and Iur interfaces are reduced to the RNC or the Node B instructing the other entity to activate or deactivate a call trace on a specific UE context as illustrated in the following discussion.

2 Discussion

2.1 Call Trace

The purpose of the call trace procedure is to inform the receiving entity that it should begin producing a trace record on a specific UE context within the UTRAN. Call trace is used to gather information on a UE context and to report the information to a collection entity for further analysis of the data. A call trace may be initiated in either the RNC or the Node B. If the trace requires data from the other entity, the initiating entity must instruct the other NE to activate a trace on the UE context. A trace may remain local to the initiating entity depending on the implementation. The data gathered by each NE is forwarded to their respective NE manager and is thus outside the scope of this document. The Iub and the Iur interfaces do not provide transport for any call trace generated data.

The initiating entity of a trace is responsible for determining the procedure to follow when a UE hands between Node B's. In the case of an RNC initiated trace, the RNC will determine whether to activate the trace in the destination Node B of a handover. In the case of a Node B initiated trace, it is *FFS* as to whether the Node B may indicate to the RNC whether the trace should continue after the UE leaves the Node B.

2.1.1 Node B Invoke Trace

The purpose of this dedicated procedure is to activate a Node B initiated trace on a specific UE context within the RNC. The *NODE B INVOKE TRACE* message will contain the types of data to collect along with a reference number to be used by the management system to correlate all data collected. If the RNC is not the SRNC, the CRNC may also activate the trace within the SRNC by forwarding the *NODE B INVOKE TRACE* message along to the SRNC.

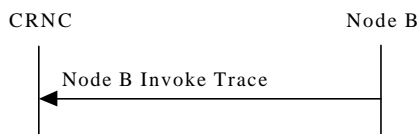


Figure 1 Node B Invoke Trace at the CRNC

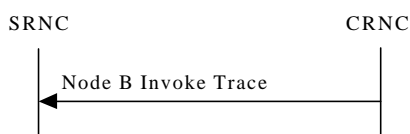


Figure 2 Node B Invoke Trace at the SRNC

If the RNC is in an overload situation in which activating a call trace would be detrimental to the system, the RNC may choose not to activate the trace. In this case, no trace data for the specified UE will be forwarded to the management system by the RNC. However, the trace in the initiating Node B will continue until either the RNC deactivates the trace or the Node B terminates the trace. An RNC overload situation does not necessarily result in deactivating the trace in the Node B.

The *NODE B INVOKE TRACE* message contains the following information:

- RNC Communication Context ID
- Trace Reference Number
- Trace Data Type
- Destination OMC ID
- Trace Continue Indicator (*FFS*)

2.1.2 RNC Invoke Trace

The purpose of this dedicated procedure is to activate an RNC initiated trace on a specific UE context within a Node B. The *RNC INVOKE TRACE* message will contain the types of data to collect along with a reference number to be used by the management system to correlate all data collected. If the RNC is not the CRNC, the *RNC INVOKE TRACE* will first be sent to the CRNC and then forwarded along to the Node B.

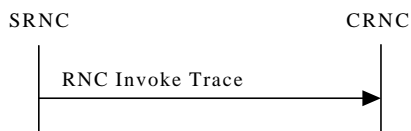


Figure 3 RNC Invoke Trace forwarded through the CRNC

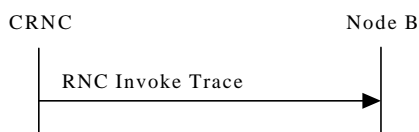


Figure 4 RNC Invoke Trace

If the Node B is in an overload situation in which activating a call trace would be detrimental to the system, the Node B may choose not to activate the trace. In this case, no trace data for the

specified UE will be forwarded to the management system by the Node B. However, the trace in the RNC will continue until the RNC terminates the trace. A Node B overload situation does not necessarily result in deactivating the trace in the RNC.

The *RNC INVOKE TRACE* message contains the following information:

- Node B Communication Context ID
- Trace Reference Number
- Trace Data Type
- Destination OMC ID

2.1.3 Node B Deactivate Trace

The purpose of this dedicated procedure is to deactivate a Node B initiated trace for a specific UE context within the RNC. The Node B may decide to deactivate the trace because the criteria for the trace has been met, or because of a system overload condition that may be resolved by reducing call trace traffic. The *NODE B DEACTIVATE TRACE* message will contain the UE context identifier used to determine which UE to stop tracing. If the RNC is not the SRNC, the CRNC must also deactivate the trace within the SRNC by forwarding the *NODE B DEACTIVATE TRACE* along to the SRNC.

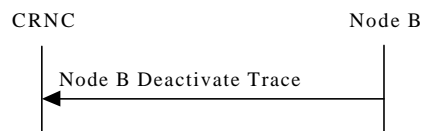


Figure 5 Node B Deactivate Trace

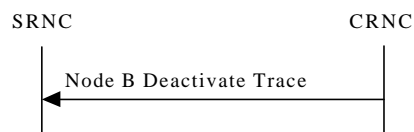


Figure 6 Node B Deactivate Trace at the SRNC

2.1.4 RNC Deactivate Trace

The purpose of this dedicated procedure is to deactivate an RNC initiated trace for a specific UE context within the Node B. The RNC may decide to deactivate the trace because the criteria for the trace has been met, or because of a system overload condition that may be resolved by reducing call trace traffic. The RNC does not necessarily have to be the initiator of the trace to deactivate the trace. The *RNC DEACTIVATE TRACE* message will contain the UE context identifier used to determine which UE to stop tracing. If the RNC is not the CRNC, the *RNC DEACTIVATE TRACE* will first be sent to the CRNC and then forwarded along to the Node B.

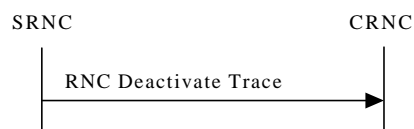


Figure 7 RNC Deactivate Trace forwarded through the CRNC

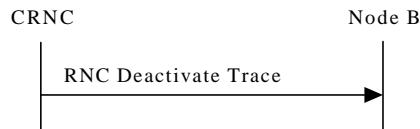


Figure 8 RNC Deactivate Trace

2.2 CN Invoke Trace

The purpose of the CN Invoke Trace procedure is to inform the receiving entity that it should begin producing a trace record on this particular transaction.

The trace is invoked by the CN sending a CN INVOKE TRACE message to the UTRAN.

The events and parameters to be recorded are indicated in the “Trace type” information element.

The element “OMCIId”, if present, indicates the OMC to which the record is destined.

~~The CN may allocate and include an “CN transaction reference” (typically a call reference) into the CN INVOKE TRACE message. The transaction reference is contained in the information element “TransactionId”.~~

The message includes a trace reference which is allocated by the entity which triggered the trace.

The element “TriggerId”, if present, indicates the entity which triggered the trace.

The trace reference ~~and~~, triggerId ~~and transactionId~~ Information Elements are used to tag the trace record to allow simpler construction of the total record by the entity which combines trace records.

The message is sent as a connection oriented message on the connection on which a trace is required. The signalling flow of the CN Invoke Trace procedure is shown in Figure 9.

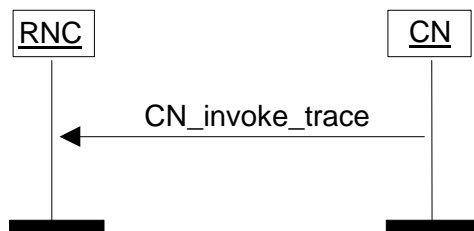


Figure 9 CN Invoke Trace Procedure.

2.3 CN Deactivate Trace

The purpose of the CN Deactivate Trace procedure is to inform the receiving entity that it should terminate collecting trace data on a particular transaction. The CN may decide to deactivate the trace because the criteria for the trace has been met, or because of a system overload condition that may be resolved by reducing call trace traffic. The trace is deactivated by the CN sending a CN DEACTIVATE TRACE message to the UTRAN. The message includes a trace reference number, which is used to identify the trace to deactivate. The message is sent as a connection oriented message on the connection on which a trace is activated. The signalling flow of the CN Deactivate Trace procedure is shown in Figure 10.

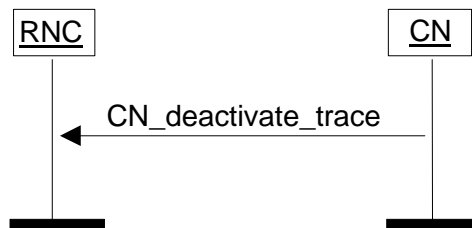


Figure 10 CN Deactivate Trace Procedure.

2.4 Message Functional Definition and Content

2.4.1 Node B Invoke Trace

Information Element	Reference	Type
Message Discriminator		M
Message Type		M
CRNC Communication Context ID		M
Trace Reference Number		M
Trace Data Type		M
Destination OMC Identifier		O
Trace Continue Indicator		<i>FFS</i>

2.4.2 RNC Invoke Trace

Information Element	Reference	Type
Message Discriminator		M
Message Type		M
Node B Communication Context ID		M
Trace Reference Number		M
Trace Data Type		M
Destination OMC Identifier		O

2.4.3 Node B Deactivate Trace

Information Element	Reference	Type
Message Discriminator		M
Message Type		M
CRNC Communication Context ID		M
Trace Reference Number		M

2.4.4 RNC Deactivate Trace

Information Element	Reference	Type
Message Discriminator		M
Message Type		M
Node B Communication Context ID		M
Trace Reference Number		M

2.4.5 CN Deactivate Trace

Information Element	Reference	Type
Message Type		M
Trace Reference Number		M

2.5 Information Element Functional Definition and Contents

This section defines the message types for the information elements introduced in section 2.4 that are not already defined in [2] or [3].

2.5.1 Trace Reference Number

The Trace Reference Number is the number used by the management system to consolidate all call trace data collected by each NE for a UE context.

2.5.2 Trace Data Type

The Trace Data Type indicates the call trace data to be collected for a UE context.

2.5.3 Trace Continue Indicator

The Trace Continue Indicator informs the RNC whether or not a call trace should continue once the UE hands out of the current Node B. The use of this element is *FFS*.

2.5.4 Destination OMC Identifier

The Destination OMC Identifier is used if the call trace data needs to be forwarded to a management system other than the one associated with the RNC in which the trace is being activated.

3 Proposal

The following changes to TS 25.413 [1] are proposed –

1. Replace section 8.11 – CN Invoke Trace with the updated contents of section 2.2 (CN Invoke Trace).
2. Include a new sub-section 8.x – CN Deactivate Trace in the RANAP Procedures (section 8) with the contents of section 2.3 (CN Deactivate Trace).
3. Include a new section 9.1.x – CN Deactivate Trace with the contents of section 2.4.5 (CN Deactivate Trace).

The following changes to TS 25.423 [2] are proposed –

1. Include a new sub-section 8.2.x – Call Trace in the DCH Procedures (section 8.2) with the contents of Section 2.1 (Call Trace) with the following exception:
 - These figures should not be included: Figure 1, Figure 4, Figure 5, and Figure 8
2. Include new sub-sections in section 9.1 – with the contents of Sections 2.4.1, 2.4.2, 2.4.3, and 2.4.4.
3. Include new sub-sections in section 9.2.1 with the contents of Sections 2.5.1, 2.5.2, 2.5.3, and 2.5.4.

The following changes to TS 25.433 [3] are proposed –

1. Include a new sub-section 8.2.x – Call Trace in the NBAP Dedicated Procedures (section 8.2) with the contents of Section 2.1 (Call Trace) with the following exception:
 - These figures should not be included: Figure 2, Figure 3, Figure 6, and Figure 7
2. Include new sub-sections in section 9.1 – with the contents of Sections 2.4.1, 2.4.2, 2.4.3, and 2.4.4.
3. Include new sub-sections in section 9.2.1 with the contents of Sections 2.5.1, 2.5.2, 2.5.3, and 2.5.4.

4 References

- [1] 3GPP TS 25.413 - UTRAN Iu Interface RANAP Signalling, v.1.2.1
- [2] 3GPP TS 25.423 – UTRAN Iur Interface RNSAP Signalling v1.3.1
- [3] 3GPP TS 25.433 - NBAP Specification v1.2.0