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Technical Report

Universal Mobile Telecommunications System (UMTS); Formal Analysis of the 3G Authentication Protocol (3GPP TR 33.902 version 4.0.0 Release 4)

Reference

RTR/TSGS-0333902Uv4

Keywords

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Foreword

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Foreword

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z the third digit is incremented when editorial only changes have been incorporated in the document.

1 Scope

This report contains formal analyses of the authentication and key agreement (AKA) protocol specified in 3G TS 33.102. These analyses are carried out using various means of formal logic suitable for demonstrating security and correctness properties of the AKA protocol.

The structure of this technical specification is as follows:

clause 2 lists the references used in this specification;

clause 3 lists the definitions and abbreviations used in this specification;

clause 4 refers to the main body of this report. The main body is only referred to because it is not available in Word-, but only in pdf-format. The corresponding .pdf-documents are attached to this document.

2 References

The following documents contain provisions which, through reference in this text, constitute provisions of the present document.

- References are either specific (identified by date of publication, edition number, version number, etc.) or non-specific.
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All references are specific (identified by date of publication, edition number, version number, etc.) and are contained in the subsections of section 4 of this document.

3 Definitions and Abbreviations

All definitions and abbreviations are contained in the subsections of section 4 of this document.

4 Formal analyses

4.1 Formal analysis of the 3G authentication protocol with modified sequence number management

Annex A (TR_33902_Annex_A.pdf) contains a formal analysis of the 3GPP mechanism using a technique called Temporal Logic of Actions (TLA). The analysis seeks to prove that the 3GPP mechanism, if correctly implemented, will not "crash" or fall into failure scenarios.

4.2 Formal analysis of the 3G authentication and key agreement protocol

The formal analysis contained in Annex B (TR_33902_Annex_B.pdf) complements the TLA-based formal analysis contained in Annex A. An enhanced BAN logic is used to prove that the 3GPP authentication and key agreement protocol meets the required security goals.

Annex A: Formal Analysis of the 3G Authentication Protocol with Modified Sequence Number Management

Annex B:
Formal analysis of 3G authentication and key agreement protocol

Annex C:
Change history

Change history					
TSG SA#	**Version**	**CR**	**Tdoc SA**	**New Version**	**Subject/Comment**
SA#05	0.1.0			3.0.0	Approved at SA#5 and placed under TSG SA Change Control
SA#06	3.0.0	001	SP-99589	3.1.0	Formal analysis of the 3G authentication protocol
09- 2001	3.1.0		-	4.0.0	Updated to Rel-4 for completeness of Rel-4 specification set (no technical changes)

History

Document history		
V4.0.0	September 2001	Publication