



Network Equipment Security Assurance Scheme - Overview

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1. Introduction

1.1. Overview

This document describes the GSMA Network Equipment Security Assurance Scheme (NESAS). The objective of NESAS is to provide an industry-wide security assurance framework to facilitate improvements in security levels across the whole industry.

NESAS defines security requirements and an assessment framework for secure product development and product lifecycle processes, as well as security test cases for the security evaluation of network equipment.

NESAS is of value to both operators and vendors, it is intended to be used alongside other mechanisms to ensure a network is secure, in particular an appropriate set of security policies covering the whole lifecycle of a network. These policies can also include the application of other published GSMA security recommendations and participation in the GSMA's operational security services such as CVD [10] and T-ISAC [11].

One of the motivations for developing NESAS is that the scheme will help vendors and operators avert fragmented regulatory security requirements. NESAS should be used globally as a common baseline, on top of which individual operators or national IT security agencies may want to put additional security requirements.

An introduction to NESAS is given in Section 2. The sections thereafter explain NESAS in more detail but still at a high level and more detailed descriptions are contained in the various documents referenced in Section 1.6.

1.2. Scope

This document has been produced for readers who want to familiarise themselves with NESAS. It provides an overview of the NESAS scheme and defines the NESAS Dispute Resolution Process (NESAS DRP). GSMA documents FS.14 [3], FS.15 [4], FS.16 [5], FS.47 [7] and FS.50 [9] describe NESAS in greater detail. FS.46 [6] provides additional guidance on how to conduct the Equipment Vendor development and lifecycle processes assessment, defined in FS.15 [4]. The structure and relationship of all the documents within NESAS, including 3GPP reference documents [12] describing methodology and security targets can be seen in Figure 1. Informative documents are marked as such. All the others are normative.

1.3. Document Maintenance

NESAS was originally created and developed by GSMA and responsibility for its maintenance and development of the NESAS specifications rests with the NESAS Group, which comprises representatives from mobile telecom network operators, infrastructure and equipment vendors, security auditors and test laboratories.

The NESAS Group is responsible for maintaining the NESAS specifications and for facilitating periodic reviews involving all relevant stakeholders.

The Scheme Owner using NESAS specifications can add additional documentation and will be responsible for development and maintenance of its own documents.

Official Document FS.13 – Network Security Assurance Scheme - Overview

<p>Document title: GSMA PRD FS.13 Network Equipment Security Assurance Scheme – Overview</p>		
This document	Description: High level explanation of NESAS	Owner: GSMA
<p>Document title: GSMA PRD FS.14 Network Equipment Security Assurance Scheme – Security Test Laboratory Accreditation</p> <p>Description: Test laboratory accreditation process and requirements</p> <p style="text-align: right;">Owner: GSMA</p>	<p>Document title: GSMA PRD FS.15 Network Equipment Security Assurance Scheme – Development and Lifecycle Assessment Methodology</p> <p>Description: Methodology of vendor development and lifecycle processes assessment</p> <p style="text-align: right;">Owner: GSMA</p>	<p>Document title: GSMA PRD FS.16 Network Equipment Security Assurance Scheme – Development and Lifecycle Security Requirements</p> <p>Description: Requirements for vendor development and lifecycle processes assessment</p> <p style="text-align: right;">Owner: GSMA</p>
<p>Document title: informative GSMA PRD FS.46 Network Equipment Security Assurance Scheme – Audit Guidelines</p> <p>Description: Guidelines to Auditors and Equipment Vendors on how to conduct the vendor assessment</p> <p style="text-align: right;">Owner: GSMA</p>	<p>Document title: GSMA PRD FS.47 Network Equipment Security Assurance Scheme – Product and Evidence Evaluation Methodology</p> <p>Description: Methodology of product and evidence evaluation</p> <p style="text-align: right;">Owner: GSMA</p>	<p>Document title: GSMA PRD FS.50 Network Equipment Security Assurance Scheme – Security Assurance Specification Development Guidelines</p> <p>Description: Guidelines to standards development organisations</p> <p style="text-align: right;">Owner: GSMA</p>
<p>Document title: informative 3GPP TR 33.926 Security Assurance Specification (SCAS) threats and critical assets in 3GPP network product classes</p> <p>Description: Threat model applied for defining 3GPP SCASes</p> <p style="text-align: right;">Owner: </p>	<p>Document title: 3GPP TS 33.117 Catalogue of General Security Assurance Requirements</p> <p>Description: Generic SCAS for all Network Functions</p> <p style="text-align: right;">Owner: </p>	<p>SCAS specific to Network Functions, defined by 3GPP or another SDO</p> <p>Reference: https://www.gsma.com/security/nesas-security-assurance-specifications/</p> <p style="text-align: right;">Owner: Other  SDO</p>

1. NESAS Documents Overview

1.4. Definitions

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Term	Description
Audit	A review and assessment described in FS.15 that is undertaken and completed by an Audit Team against the requirements set out in FS.16.
Audit Report	Document presenting the results of the Audit conducted at the Equipment Vendor by the Audit Team.
Audit Summary Report	A subset of the Audit Report created by the Audit Team that summarises the key results.
Audit Team	Collective group of Auditors, generally to consist of two or more people, that undertake a Vendor Development and Product Lifecycle Processes Audit.
Auditing Organisation	Organisation selected by Equipment Vendor to conduct Audits of Vendor Development and Product Lifecycle Processes, employs or contracts Auditors.
Auditor	Individual that is qualified to perform Vendor Development and Product Lifecycle Processes Audits and makes up part of the Audit Team. Note: This definition does not mandate a certain employer for the Auditor, which is possibly employed by a dedicated Auditing Organisation (or could be freelancer). The qualification is ensured by the certification of said individuals.
Compliance Declaration	A written statement by the Equipment Vendor that confirms it adheres to the previously assessed Vendor Development and Product Lifecycle Processes for the particular Network Product that is provided to a NESAS Security Test Laboratory for evaluation.
Compliance Evidence	Evidence to be provided by the Equipment Vendor to the NESAS Security Test Laboratory, demonstrating that the Equipment Vendor applied its previously internally assessed and independently audited Vendor Development and Product Lifecycle Processes to build the Product under evaluation. All Compliance Evidence for one Network Product is collected in one Compliance Declaration. Note: An Auditor defines in the Audit Report, which Compliance Evidence is required for subsequent product evaluations.
Conformance Claim	A written statement by the Equipment Vendor that confirms it meets the NESAS security requirements for the Vendor Development and Product Lifecycle processes that are to be assessed.
Equipment Vendor	Organisation that develops, maintains and supplies to network equipment that supports functions defined by 3GPP or another SDO.
Evaluation Report	Documentation of the results of Evidence Evaluation and Network Product Evaluation, produced by an accredited NESAS Security Test
Evidence Evaluation	Activity in NESAS of evaluating that the Product under Evaluation (PuE) was developed in accordance with the previously assessed Vendor Development and Product Lifecycle Processes of the Equipment Vendor.
GSMA Member	For the purpose of this document only, this is defined as a GSMA Parent Group Member, Full Member, Associate Member or Rapporteur Member.

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Term	Description
Interim Audit	An Audit of an Equipment Vendor's Vendor Development and Product Lifecycle Processes focussed only on security requirements revised or introduced since the Equipment Vendor's last Audit that allows the Equipment Vendor to demonstrate compliance with the new requirements. The report from the Interim Audit is treated as an addendum to the Audit Report from the last Audit of the Equipment
ISO/IEC 17025 Accreditation Body	An ILAC member that is recognised as having competence to carry out ISO/IEC 17025 test laboratory audits
NESAS Oversight Board	The body overseeing NESAS, run by the GSMA. It is responsible for the governance of the Vendor Development and Product Lifecycle Process assessments and quality assurance of NESAS.
NESAS Dispute Resolution Process	The process used by the NESAS DRC to resolve disputes in accordance to Section 3.8.
NESAS Dispute Resolution Committee (DRC)	A panel established to adjudicate on disputes pursuant to Section 3.8.
NESAS Security Test Laboratory	A test laboratory that is ISO/IEC 17025 accredited in the context of NESAS and that is authorised to conduct Network Product evaluations, as defined in FS.14.
Network Function	A defined processing function in a network, which has defined functional behaviour and defined interfaces.
Network Product	Network Equipment developed, maintained and supplied by an Equipment Vendor, consisting of one or more Network Function(s).
Network Product Evaluation	Activity of evaluating the Product under Evaluation (PuE) in NESAS, according to requirements and test cases taken from NESAS-adopted Security Assurance Specifications (SCAS).
Product under Evaluation	The Network Product for which an evaluation is sought by the Equipment Vendor.
Scheme Owner	Organisation or authority responsible for developing and maintaining a specific security assurance or certification scheme that uses the NESAS specifications (refer to Annex A.2 for licensing of NESAS Documentation).
Security Assurance Specification	Specification containing security requirements and test cases for a defined Network Function or a group of Network Functions. It is created and maintained by a Standards Development Organisation (SDO).
Subject Matter Expert	Individual that is experienced in all NESAS related technical details, such as mobile networks, network and equipment security, and testing of network equipment and network services.
Vendor Development and Product Lifecycle Processes	The stages through which Network Products journey throughout their development including planning, design, implementation, testing, release, production and delivery and the stages to end of life including maintenance and update releases during their lifetime.

1.5. Abbreviations

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Term	Description
3GPP	3rd Generation Partnership Project
3GPP TR	3GPP Technical Report
3GPP TS	3GPP Technical Specification
CC	Common Criteria
CIS	Centre for Internet Security
ETSI	European Telecommunications Standards Institute
FASG	Fraud and Security Group
GSMA	GSM Association
IAB	ISO Accreditation Body
ILAC	International Laboratory Accreditation Cooperation
ISO	International Organisation for Standardization
IT	Information Technology
MNO	Mobile Network Operator
NESAS	Network Equipment Security Assurance Scheme
NESAS DRC	NESAS Dispute Resolution Committee
NESAS DRP	NESAS Dispute Resolution Process
NP	Network Product
PuE	Product under Evaluation
SAS	Security Accreditation Scheme
SCAS	Security Assurance Specification
SDO	Standards Development Organisation
SME	Subject Matter Expert
TSG	Technical Specification Group

1.6. References

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Ref	Doc Number	Title
	3GPP TR 33.926	Security Assurance Specification (SCAS) threats and critical assets in 3GPP network product classes
	3GPP TS 33.117	Catalogue of general security assurance requirements
	GSMA PRD FS.14	Network Equipment Security Assurance Scheme – Security Test Laboratory Accreditation
	GSMA PRD FS.15	Network Equipment Security Assurance Scheme – Vendor Development and Product Lifecycle Assessment Methodology
	GSMA PRD FS.16	Network Equipment Security Assurance Scheme – Vendor Development and Product Lifecycle Security Requirements
	GSMA PRD FS.46	Network Equipment Security Assurance Scheme – Audit Guidelines
	GSMA PRD FS.47	Network Equipment Security Assurance Scheme – Product and Evidence Evaluation Methodology
	GSMA PRD FS.50	Network Equipment Security Assurance Scheme – Security Assurance Specification Development Guidelines
	RFC 2119	“Key words for use in RFCs to Indicate Requirement Levels”, S. Bradner, March 1997. Available at http://www.ietf.org/rfc/rfc2119.txt
	GSMA CVD	https://www.gsma.com/security/gsma-coordinated-vulnerability-disclosure-programme/
	GSMA T-ISAC	https://www.gsma.com/security/t-isac/
	3GPP 33 Series	https://www.3gpp.org/DynaReport/33-series.htm
	NESAS Web Site	https://gsma.com/nesas
	List of Security Assurance Specifications	List of Security Assurance Specifications adopted by NESAS, https://www.gsma.com/security/nesas-security-assurance-specifications/

1.7. Conventions

The key words “must”, “must not”, “required”, “shall”, “shall not”, “should”, “should not”, “recommended”, “may”, and “optional” in this document are to be interpreted as described in RFC 2119 [9].

All the document, including Annexes, is normative, unless otherwise explicitly stated.

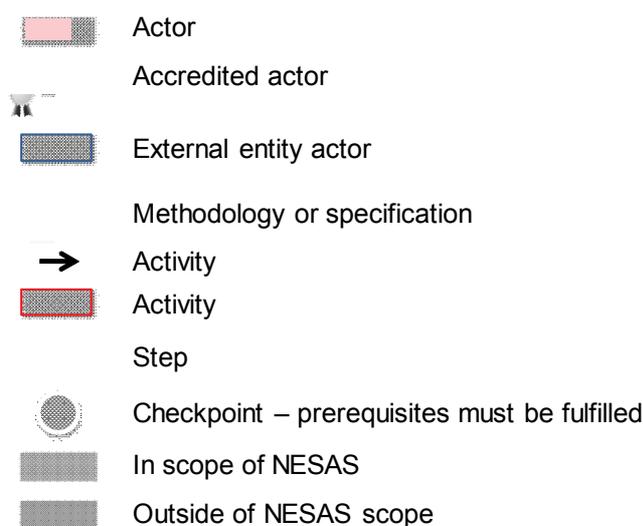
Examples in this document are used to provide additional information for understanding and are not intended to limit generality, applicability, and/or coverage of NESAS.



This icon indicates that there are references to documents that tackle the topic of the section where it appears in greater detail.

References

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Key for the figures in this document:



2. Introduction to Security Assurance in the Mobile Industry

A security assurance scheme always needs to consider the environment in which the scheme will operate. For a scheme addressing mobile network security the following aspects need to be considered:

- Network technology and products,
- Organisational security,
- Visibility of network equipment security levels,
- Operational feasibility, and
- Market acceptance and participation.

All relevant stakeholders need to commit to the scheme. Consequently, the effectiveness, cost, effort and complexity are important parameters that contribute to the ultimate success of the scheme. Solutions designed and agreed by all involved stakeholders are more likely to secure support.

With the increasing complexity of mobile networks and heightened security awareness, NESAS was designed to meet the needs of disparate stakeholders including:

- Mobile network operators,
- Equipment Vendors,
- Official/Governmental information security agencies and regulators.

In many countries, Mobile Network Operators (MNO) are tasked by regulation to deploy and run, reliable and robust networks. As one element of achieving this MNOs rely on secure network equipment being provided by their vendors. Thus, for MNOs, it is important to be able to understand the level of security within any specific product provided by their chosen vendors. The following two approaches are considered suitable to achieve this:

- Firstly, assessment of the security related to the Vendor Development and Product Lifecycle Processes

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This allows each vendor to define its own internal processes and describe how security is integrated into the design, development, implementation, and maintenance processes. An Auditor examines these processes and determines if they are adequate and if they are applied in practice.

Whilst undergoing the Audit, only the Auditor sees the vendor's internal processes. Thus, an Audit Report can increase trust in a vendor without the vendor having to reveal internal secrets.

- Secondly, security evaluation of network equipment by a competent test laboratory with standardised security tests against an agreed security target.

This is a security evaluation of the manufactured network equipment. If there is a pre-defined set of security tests for network equipment, and if all network equipment is tested against these requirements, the achieved level of security can be objectively measured. New network equipment, as well as upgraded equipment, can be evaluated. If these tests are performed by a recognised and authorised competent test laboratory, a high quality and consistency of testing can be assured. In addition, if evaluation reports are able to be made available on request to prospective customers, further efficiencies can be achieved as tests only need to be performed once.

Although network standardisation is moving away from rigid architectures, the concept of standardised Network Functions remains. Standards that clearly define the functionality and capabilities of Network Functions can be used as the basis for the creation of clear, dedicated security requirements and test cases for all defined Network Functions. Network equipment can then be tested against applicable test cases.

Both approaches – process assessment and evaluation by testing – help MNOs determine the achieved level of security of a network product.

3. NESAS Overview

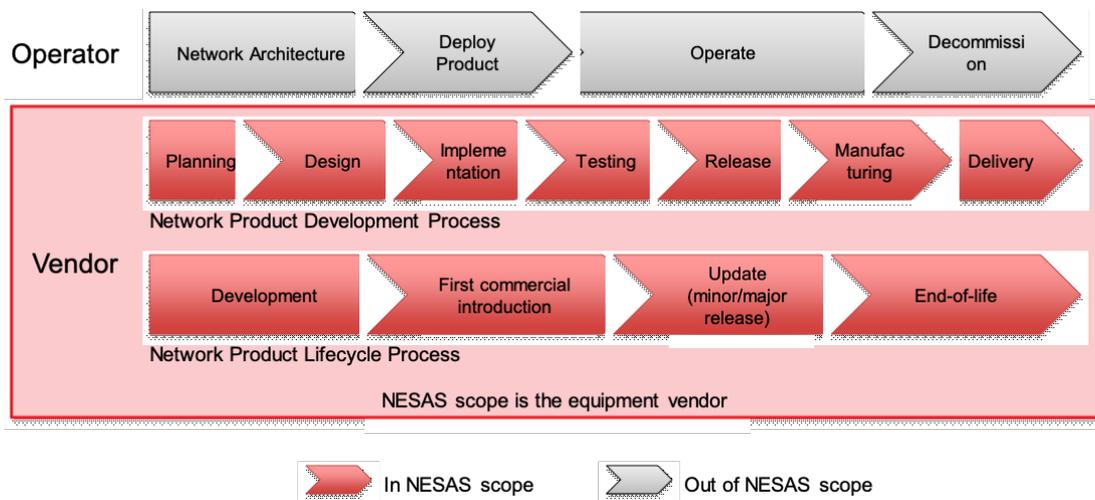
NESAS is a voluntary network equipment security assurance scheme operated and maintained by GSMA, with contributions from 3GPP, covering the methodology and security targets for equipment under test. It defines a globally applicable security baseline that network equipment vendors can meet.

Briefly, the NESAS approach consists of the following steps:

1. Equipment Vendors define and apply secure design, development, implementation, and product maintenance processes;
2. Equipment Vendors assess and claim conformance of these processes with the NESAS defined security requirements;
3. Equipment Vendors demonstrate these processes to independent Auditors;
4. Level of security of network equipment is tested and documented;
5. Tests are conducted by competent and authorised test laboratories against defined security requirements;
6. Documentation can be forwarded to purchasing operators.

3.1. Lifecycle Roles and NESAS Scope

Figure 2 depicts both Vendor and Operator lifecycles, together with assigned responsibilities and the scope of NESAS.



2. Responsibility, Accountability and NESAS Scope

Design, development and implementation of network equipment is undertaken by the Equipment Vendor. The MNO operates a reliable mobile network and relies on the Equipment Vendor to provide the required level of security resilience in their products. Network design, operating procedures and maintenance of deployed network equipment falls within the MNO’s responsibilities.

The *Network Equipment Security Assurance Scheme* (NESAS) provides a solution to meet the needs of industry and other stakeholders. The focus of NESAS, which covers an essential element of supply chain security, is on equipment vendors and their role in the chain.

3.2. Owner of and Responsibility for NESAS

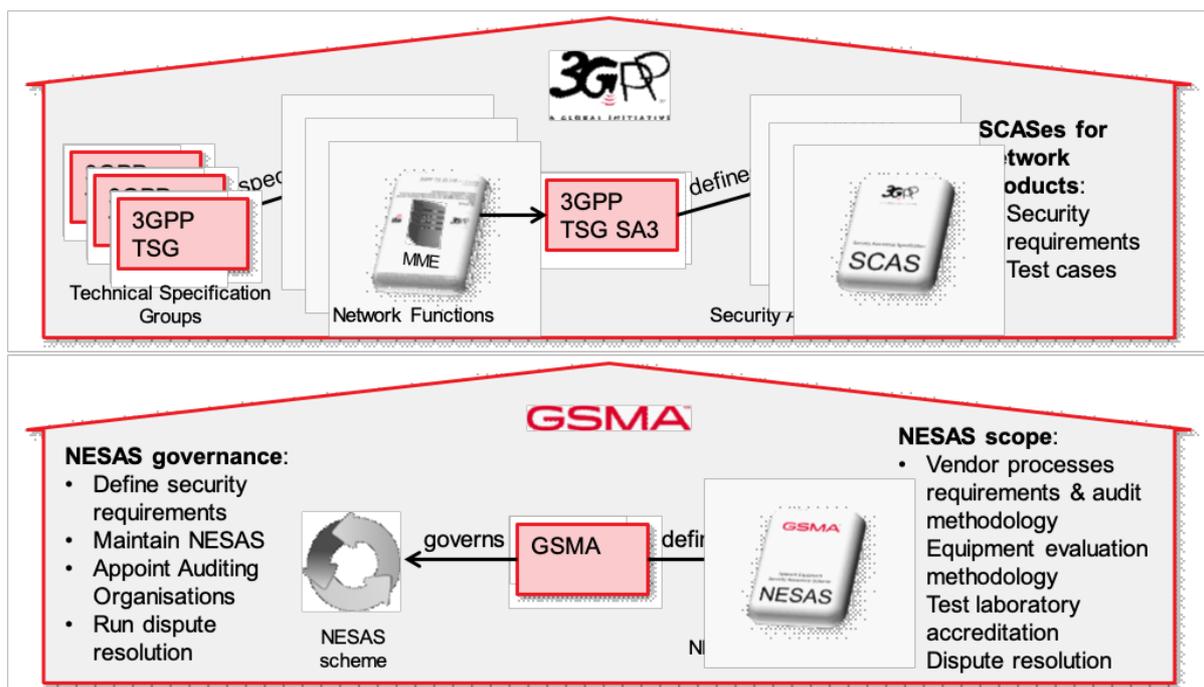
NESAS is a set of specifications, defined by GSMA, 3GPP and other Standards Development Organisations (SDOs), and is operated and governed by GSMA.

The GSMA defines and maintains the NESAS specifications, which cover assessment of the Vendor Development and Product Lifecycle Processes, NESAS Security Test Laboratory accreditation, and security evaluation of network equipment. 3GPP and other SDOs define security requirements and test cases for network equipment implementing one or more Network Functions – specified in *Security Assurance Specifications* (SCAS) [11]. The GSMA also defines a NESAS Dispute Resolution Process. All these elements combine to form the NESAS specifications.

NESAS is based on the NESAS specifications FS.14 [3], FS.15 [4], FS16 [5], FS.46 [6], FS.47 [7] and FS.50 [8], and all necessary actions to operate and govern the scheme are performed by GSMA. These actions comprise maintenance of the NESAS specifications , assignment of Auditing Organisations, maintain publicly accessible official information about NESAS on the NESAS Web Site [13], and run the NESAS Dispute Resolution Process on an in-case basis.

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Figure 3 illustrates the roles of 3GPP and GSMA within NESAS.

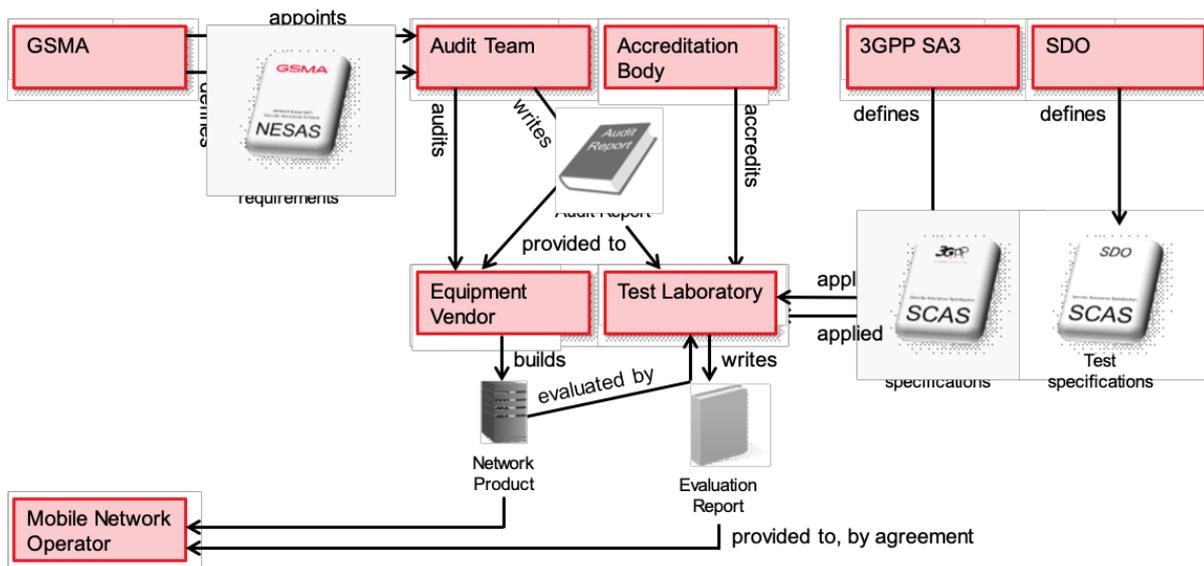


3. Roles of 3GPP and GSMA in NESAS

Network equipment that is produced and sold by an Equipment Vendor is called a *Network Product* in NESAS. It comprises one or more Network Functions. A mobile base station from a particular vendor is an example of a Network Product.

3.3. NESAS High Level Overview

Figure 4 depicts the various NESAS actors and activities that are described briefly below. The following sections provide detailed information on the different components of NESAS.



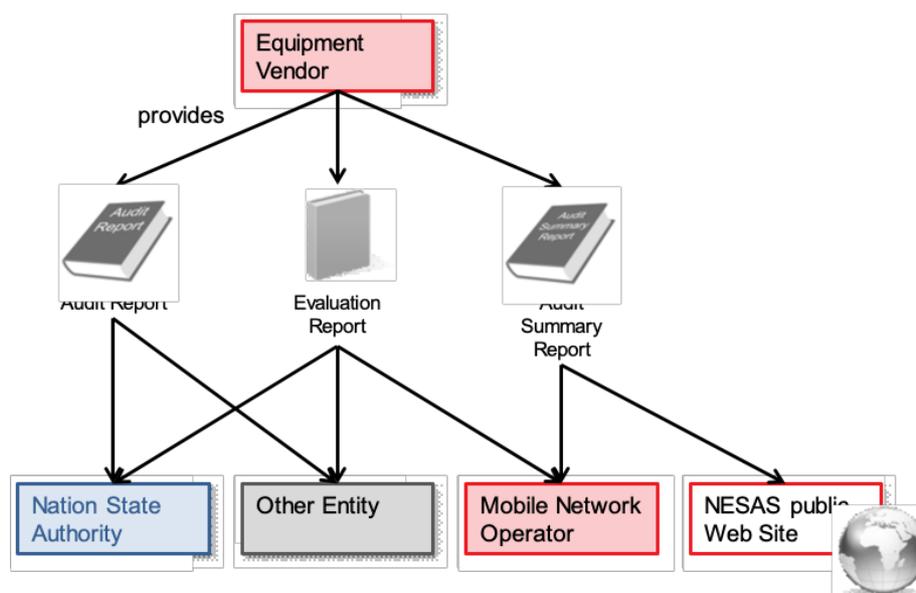
4. NESAS High Level Overview

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The GSMA appoints a panel of Audit Organisations, from which participating Equipment Vendors can select one to Audit their Vendor Development and Produce Lifecycle Processes. The selected Auditing Organisation appoints an Audit Team, which applies the NESAS methodology for the Audit, as defined by GSMA. Results of the Audit are documented in the Audit Report. If the Equipment Vendor is considered by the Audit Team to be NESAS compliant, having satisfied all of the NESAS security requirements, a copy of the Audit Summary Report may be published on the GSMA's NESAS Web Site[13].

The Equipment Vendor builds its Network Products which are given to a NESAS Security Test Laboratory for evaluation. All NESAS Security Test Laboratories are accredited by an ISO/IEC 17025 Accreditation Body that determines if the NESAS Security Test Laboratory is capable of performing meaningful Network Product tests and are authorised to perform Network Product Evaluations. The chosen NESAS Security Test Laboratory evaluates the Network Product against the relevant SCASes and verifies that the internally assessed and independently audited Vendor Development and Product Lifecycle Processes of the Equipment Vendor have been applied to the tested Network Product. The NESAS Security Test Laboratory then produces an Evaluation Report.

The Audit (Summary) Report and the Network Product Evaluation Report can then be provided to customers and additional interested parties, as illustrated in Figure 5.



5. Potential recipients of NESAS results

3.4. Appointment of Auditing Organisations

The GSMA, with the input of the NESAS Oversight Board, has created specific criteria to select and appoint Auditing Organisations. Such appointments are made periodically as part of an open tender process.

All appointed Auditing Organisations are assigned to the panel of Auditing Organisations, from which a participating Equipment Vendor can choose an Auditing Organisation to conduct their Vendor Development and Product Lifecycle Processes assessment.

The panel of Auditing Organisations consists of two (2) Auditing Organisations. Currently appointed Auditing Organisations are listed on the NESAS Web Site [13].

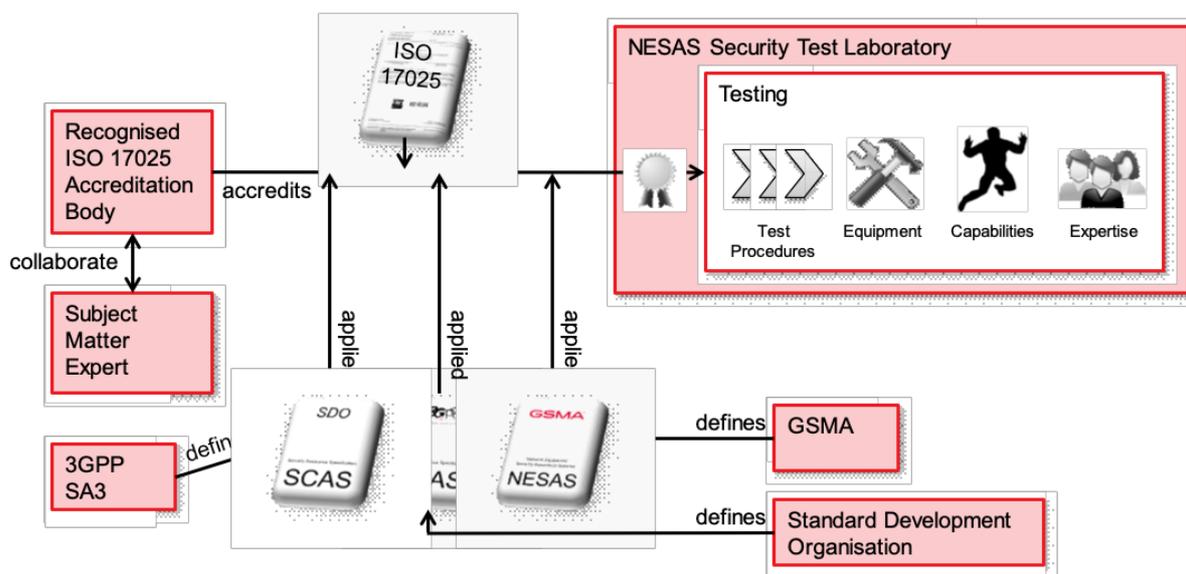
3.5. Accreditation of NESAS Security Test Laboratories

NESAS Security Test Laboratories need to be accredited in accordance with ISO/IEC 17025, which covers general requirements on testing procedures, documentation, maintenance and review of procedures, competence, independence, and impartiality. They can be owned by any entity.

As ISO/IEC 17025 is a generic accreditation, test laboratories are always accredited in the context of additional standards against which the laboratories will perform their tests. For NESAS, this means that laboratories need to demonstrate that, as well as holding ISO/IEC 17025 accreditation, they are capable of performing tests described in NESAS SCASes and that they meet the additional requirements applicable to NESAS.

An officially recognised ISO/IEC 17025 Accreditation Body is required to Audit and accredit test laboratories. On successful completion of the Audit, the test laboratory becomes an accredited NESAS Security Test Laboratory and is authorised to perform Network Product Evaluations. This process is illustrated in Figure 6.

The validity of NESAS Security Test Laboratory accreditation is defined by ISO/IEC 17025.



6. Accreditation of Test Laboratories

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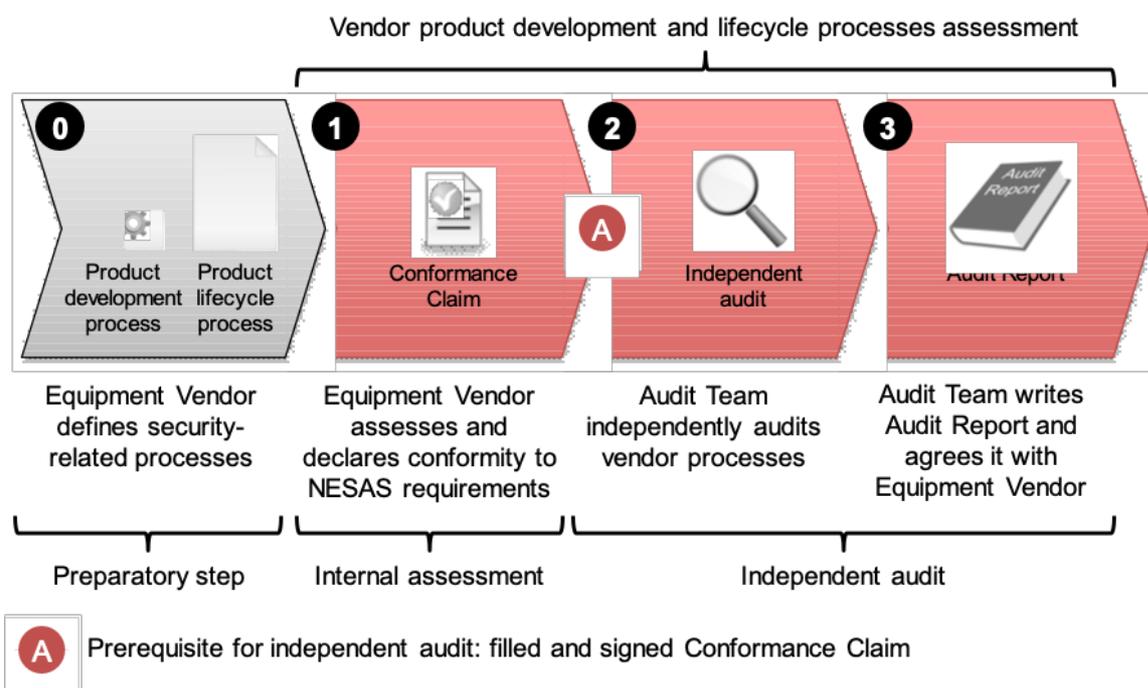


References

- FS.14 [3] defines test laboratory accreditation requirements and the process of performing the Audit and accreditation.
- FS.47 defines the methodology to be followed by accredited test laboratories to conduct the Network Product and Evidence Evaluation.
- FS.50 [8] provides guidance to SDOs on how to create and maintain SCASes that ought to be adopted by NESAS.
- SCASes from 3GPP (e.g. the generic SCAS for any network equipment 3GPP TS 33.117 [2]) and other SDOs contain test specifications the NESAS Security Test Laboratory shall be capable of performing. All current SCASes can be found at the NESAS Web Site [13], in the list of adopted Security Assurance Specifications [14].
- 3GPP TR 33.926 [1] describes the threat model that was chosen to define security requirements and test cases in 3GPP SCASes.

3.6. Assessment of Vendor Development and Product Lifecycle Processes

Figure 7 depicts, at a high level, the steps the assessment of Vendor Development and Product Lifecycle Processes consist of.



7. Sequence of activities of vendor processes assessment

As a preparatory step (Step 0 in Figure 7), the Equipment Vendor defines its own processes for Development and Product Lifecycle. These processes should define how security resilience is integrated in the vendor processes.

Step 1 in Figure 7: The Equipment Vendor defined processes are first internally assessed by the participating Equipment Vendor, which shall claim conformance and describe how it believes it complies with the defined security requirements. The result is written down in the

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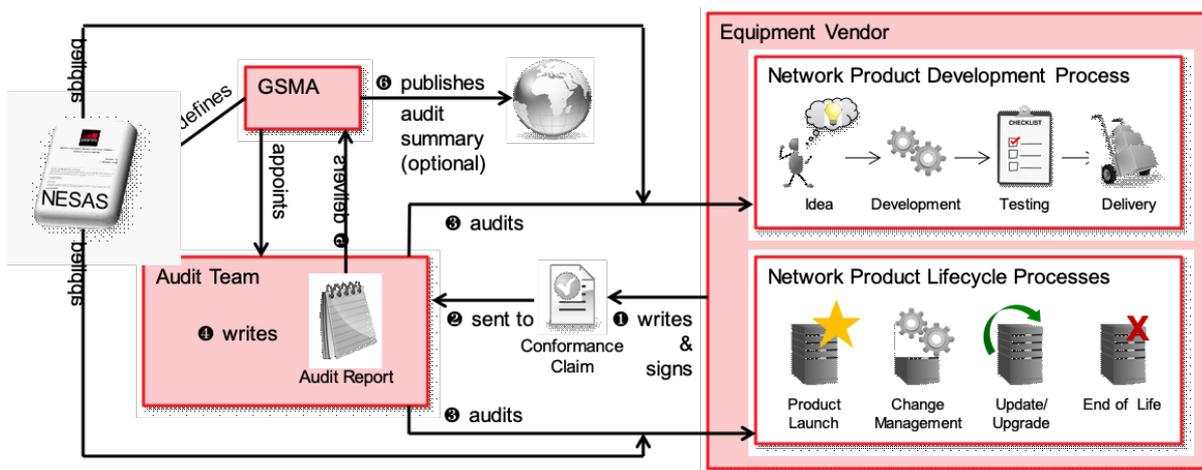
Conformance Claim, which is signed by the Equipment Vendor. Presenting the signed Conformance Claim is a prerequisite for entering the independent Audit (Checkpoint A in Figure 7).

Step 2 in Figure 7: Subsequently, the Vendor Development and Product Lifecycle Processes are audited by one of the GSMA appointed Auditing Organisations. The Equipment Vendor chooses the Auditing Organisation to perform the Audit. The Audit Team, established by the Auditing Organisation, follows the auditing methodology, defined by NESAS, and determines compliance of the Equipment Vendor to the NESAS requirements.

Audits consist of off-site process documentation reviews and on-site Audits. In exceptional circumstances where travel restrictions prevent the Auditors from attending product development sites at which Audits should be conducted, remote Audits may be performed with prior consultation with, and approval of GSMA.

Step 3 in Figure 7: The Audit Team produces an Audit Report that contains the results of the Audit and recommendations. The Audit Report shall be agreed with the Equipment Vendor and be signed by both parties. It shall also be made available to GSMA, and the Audit Report may be provided to other relevant stakeholders at the discretion of the Equipment Vendor. An Audit Summary Report is also produced, that can be published on the NESAS Web Site [13] for the purposes of highlighting NESAS participation by the Equipment vendor.

The assessment of the Vendor Development and Product Lifecycle Processes is depicted in Figure 8.



8. Assessment of vendor processes

The Equipment Vendor is only considered fully compliant, if the audited Equipment Vendor meets all the security requirements for Vendor Development and Product Lifecycle Processes, as outlined in GSMA PRD FS.16 [5], without exception. If the Equipment Vendor is found to be non-compliant with any one of the security requirements the overall Audit result considers the Equipment Vendor to be non-compliant.

The validity of an assessment lasts at most two years and may expire earlier if the assessed vendor processes change. Audits are always to be conducted against the current version of FS.15 [4] and FS.16 [5].

NESAS is a living scheme, so it is to be expected that security requirements will be added or changed and as a result, a new version of FS.16 [5] is published. These significant changes

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could impact an Equipment Vendor that has already completed an Audit against the previous version of the security requirements insofar, as its Audit Report and related material will reference an out-of-date version of the security requirements. In order to allow the Equipment Vendor to maintain and demonstrate compliance to the current security requirements, it may be possible for it to undertake an Audit that is focussed only on the changes included in the security requirements update, rather than having to undergo a full Audit. Such a focussed Audit is called an Interim Audit and it allows the Equipment Vendor to keep its compliance to NESAS security requirements current, where the vendor's process have not changed substantially, until the next full Audit of its Vendor Development and Product Lifecycle Processes falls due. Further details about Interim Audits can be found in FS.15 [4].



References

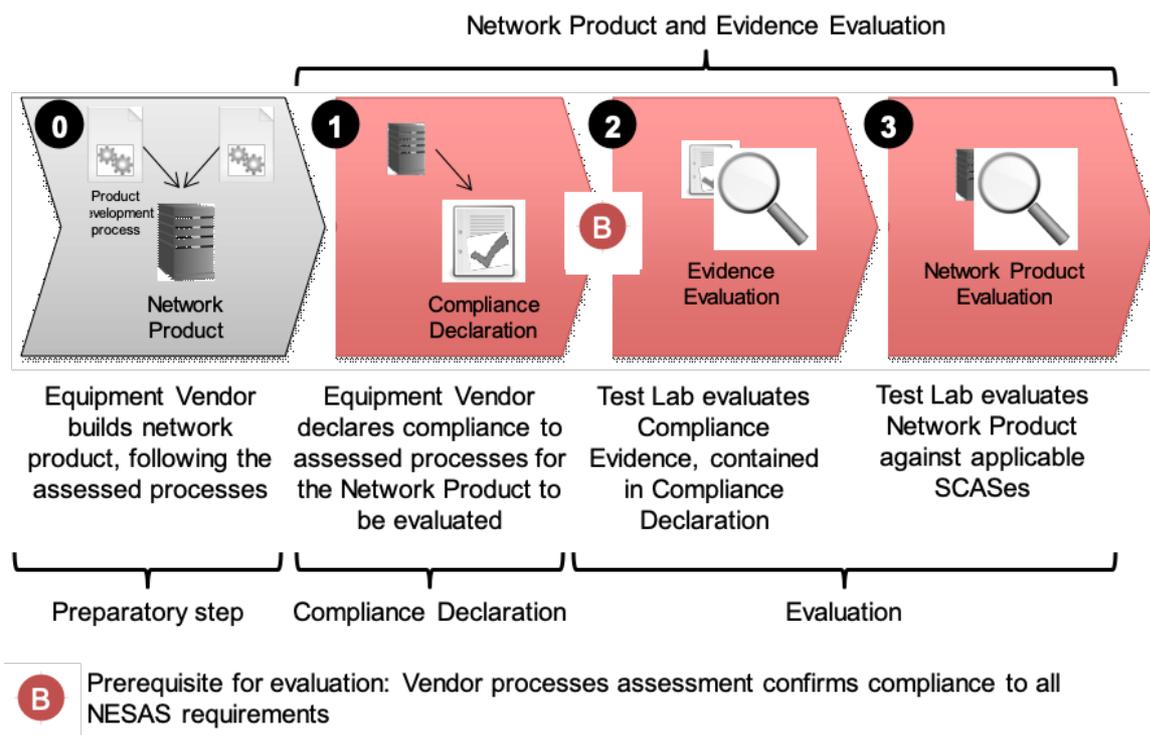
- FS.15 [4] defines the Vendor Development and Product Lifecycle Process assessment methodology, which describes the process of performing the internal assessment and independent Audit.
- FS.16 [5] defines the Vendor Development and Product Lifecycle Process security requirements that are to be met by the Equipment Vendor and to be assessed by the Audit Team.
- FS.46 [7] provides additional guidance to Equipment Vendors and Audit Teams on how to conduct the assessment of vendor development and lifecycle processes.

3.7. Network Product and Evidence Evaluation

Once an Equipment Vendor's Vendor Development and Product Lifecycle Processes internal assessment and independent Audit result in full compliance to the NESAS security requirements defined in GSMA PRD FS.16 [5], Network Products can be evaluated by an accredited and authorised NESAS Security Test Laboratory. Full compliance to the NESAS security requirements is a prerequisite for Network Product Evaluation (Checkpoint B in Figure 9)

Figure 9 depicts at a high level the steps Network Product and Compliance Evidence evaluation consists of.

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9. Sequence of activities of Network Product and Evidence evaluation

As a preparatory step (Step 0 in Figure 9), the Equipment Vendor builds the Network Product in full accordance to the previously assessed Vendor Development and Product Lifecycle processes.

Step 1 in Figure 9: The Equipment Vendor produces the Compliance Declaration, which contains all the Compliance Evidence for the Network Product under evaluation, broken down for each of the security requirements as defined in FS.16 [5].

Once this is done, the Equipment Vendor provides the Network Product and Compliance Declaration to the NESAS Security Test Laboratory. For evaluation, the Equipment Vendor chooses an accredited and authorised NESAS Security Test Laboratory and contracts directly with it.

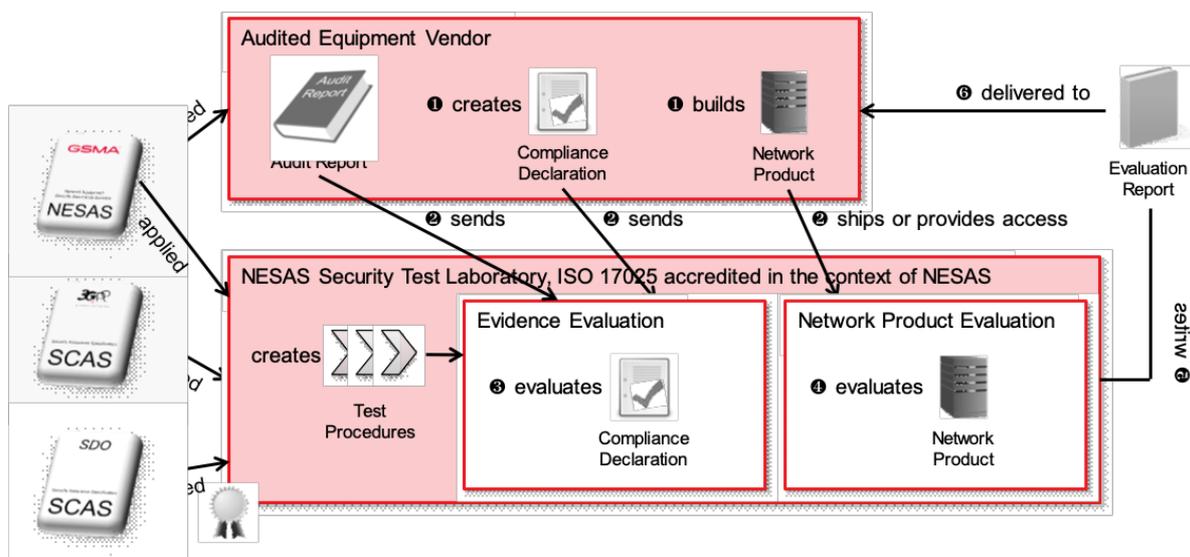
Step 2 in Figure 9: The NESAS Security Test Laboratory evaluates the provided Compliance Evidence and comprehends if the Equipment Vendor is following its own internally assessed and independently audited Vendor Development and Product Lifecycle Processes when building the Network Product under evaluation. The Audit Report that was produced during the Equipment Vendor Development and Product Lifecycle Process Audit, gives guidance to the NESAS Security Test Laboratory on how to evaluate the Compliance Evidence. In some cases it may not be possible to provide Compliance Evidence for a particular security requirement. In these cases, the Equipment Vendor shall provide a rationale instead, giving reasons. The results of Evidence evaluation are recorded in an Evaluation Report.

Step 3 in Figure 9: Test specifications from the corresponding SCASes [11] are used to create and run detailed tests for the Network Product. SCASes to be selected for evaluation depend on the functionality provided by the Network Product under Evaluation. Preparation of the test environment and configuration of the Network Product under evaluation are

Official Document FS.13 – Network Security Assurance Scheme - Overview defined in the SCASes. Test results are added to the Evaluation Report. Test results shall be documented in a level of detail that allows reproduction of the tests.

It is the Evidence evaluation that links the tested Network Product to the internally assessed and independently audited vendor processes and this is why only an Evaluation Report that contains both results – from Network Product evaluation and from Evidence evaluation – is meaningful to a MNO.

Network Product and Evidence Evaluation are illustrated in Figure 10 in more detail.



10. Evidence and Network Product Evaluation

The completed Evaluation Report is handed over to the Equipment Vendor. The Equipment Vendor can then provide the Evaluation Report to any interested MNO together with the Network Product when supplying equipment. A copy of the Evaluation Report is provided to GSMA, if the evaluated product is to be listed on the NESAS Web Site [13].

Each Network Product Evaluation is bound to a dedicated release of the Network Product and to a dedicated version of FS.47 [7]. The Evaluation Report does not expire. A new release of the Network Product will trigger the need for an up-to-date evaluation. Changes to FS.47 [7] may trigger the need for a new Network Product Evaluation. Further details can be found in FS.47 [7].

It is at the discretion of the MNO to determine from the Evaluation Report if the level of security that is reached by the Network Product is sufficient for deployment in the mobile network.

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References

- FS.47 [7] defines how Network Product evaluation and Evidence Evaluation are performed.
- FS.16 [5] defines the Compliance Evidence the vendor is obliged to provide to the NESAS Security Test Laboratory for Evaluation.
- FS.50 [8] provides guidance to SDOs on how to create and maintain SCASes that ought to be adopted by NESAS.
- SCASes of the 3GPP (e.g. the generic SCAS for any network equipment 3GPP TS 33.117 [2]) and other SDOs contain test specifications the Test Laboratory shall perform for Network Product evaluation. All current SCASes can be found at the NESAS Web Site [13] in the list of adopted Security Assurance Specifications [14].
- 3GPP TR 33.926 [1] describes the threat model that was chosen to define security requirements and test cases in 3GPP SCASes.

3.8. Dispute Resolution

3.8.1. NESAS Dispute Resolution Process (NESAS DRP)

The Network Equipment Security Assurance Scheme Dispute Resolution Committee (NESAS DRC) acts to handle disputes that may arise with regards to the implementation and/or interpretation of NESAS documentation that could be subject to disagreements between two or more parties. The NESAS DRC shall be appointed on a per dispute basis to ensure each dispute is handled in a non-partisan manner.

Disputing parties shall use all resources reasonably available to resolve disputes before involving the NESAS DRC.

Subject to the above, the GSMA shall only be contacted if there is a dispute between two or more parties with respect to the interpretation and implementation of NESAS procedures or documentation.

The NESAS DRP can be invoked by the requesting parties sending a written request (e-mail) to the appropriate GSMA designated contact who, upon review, will forward the written request to all other parties involved in the dispute, giving all the respondent parties the opportunity to comment on the wording of the invocation.

Upon the opportunity for parties to comment, if the dispute cannot be resolved within a period of no more than twenty (20) calendar days:

- (i) The requesting party may invoke the NESAS DRP; and
- (ii) All parties concerned are asked to supply all arguments and points of view in relation to the matter to the GSMA. The GSMA in turn will supply the same to the respective NESAS DRP upon its formation.

At the time of invoking the NESAS DRP, the GSMA should determine if a similar dispute has been previously resolved by the NESAS DRC. If such a dispute has previously been ruled on and published, the affected parties may decide to follow the decision made.

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For each dispute, the NESAS DRC shall consist of three individuals who have not been directly involved in the matter and who are not employees of entities that may be affiliated either with the appellant or a respondent company group.

The appellant(s) shall appoint one impartial member of the NESAS DRC. The named respondent(s), shall also appoint one impartial member. When more than one respondent is named, the respondents will collectively agree on the appointment of a single member. The appellant and the respondent(s) shall each identify their appointed panel member within five (5) business days of the GSMA's determination that a hearing is necessary. The two members so selected by the parties shall then appoint the third member; this appointment of the third member shall occur within ten (10) business days of the determination that an adjudication is necessary.

Disputing parties shall use all resources reasonably available to resolve disputes before involving the NESAS DRC. All parties involved should identify the disputed issue(s) in advance in order to have a common understanding of the issue(s). All parties involved in the dispute should agree on the wording of the NESAS DRC invocation, including the time at which the issue causing the dispute occurred.

For the purpose of the NESAS Dispute Resolution Process (DRP), the GSMA will, to the extent available and accessible, provide to the appellant and respondent the relevant NESAS documentation in effect at the time of the dispute. Later versions of these documents may also be considered upon request, if relevant to the dispute.

The NESAS DRC shall proceed according to the NESAS DRP and may provide additional guidelines and/or define further proceedings as it may deem necessary for the achievement of a resolution. The NESAS DRC will use reasonable commercial efforts to seek to resolve disputes as soon as practical and without undue delay (normally within ten (10) days of the notification). A majority decision shall then be made by the NESAS DRC members.

The GSMA is responsible for the distribution of the NESAS DRC ruling/decision in writing.

The NESAS DRC ruling/decision is binding between the Parties involved in the NESAS Dispute Resolution Process at the time of the dispute as agreed during the invocation of the NESAS Dispute Resolution Process.

Rulings/decisions of the NESAS DRC could vary in terms of their nature and severity and could result in sanctions such as the revocation of product evaluations held by vendors or test lab accreditations and authorisations. Sanctions to be imposed, if any, are entirely a matter for the NESAS DRC to decide on.

Any ruling/decision of the NESAS DRC may be anonymised, shared with the NESAS Oversight Board and used as an example for improving the current NESAS scheme as long as it is not attributable to a particular involved party.

Note: In the event that a need to change NESAS documentation has been identified as a result of the decision, the NESAS DRC shall refer the case to the NESAS Oversight Board, which will develop the appropriate change request and propose it to the relevant document approval authority.

The NESAS DRP shall be administered and documented by the GSMA, as the GSMA deems appropriate.

3.8.2.Possible Dispute Scenarios

The GSMA neither assesses, reviews nor interprets the received Audit Report, the Evaluation Report, and the Audit Summary Report in any way. The GSMA keeps the Audit Report and the Evaluation Report confidential in case a dispute is filed by an involved stakeholder which could lead to the invocation of the NESAS Dispute Resolution Process. Should any involved party see the need to challenge any decision of an Audit Team, or a NESAS Security Test Laboratory, it may refer the matter to the NESAS Dispute Resolution Process. Similarly, should any party see the need to challenge the Audit Guidelines in FS.46 [6], it may refer the matter to the NESAS Oversight Board. The following table illustrates a number of possible dispute scenarios that could arise within the Security Test Laboratory accreditation element of NESAS that involve a variety of parties. The table merely captures example scenarios and is not intended to be exhaustive.

	Operator	Vendor	Audit Team	Test Lab	NESAS OB
Operator		NP or development and lifecycle process security inconsistency	Vendor assessment undertaken by Audit Team and challenged by operator		Operator believes SCAS is inadequate or challenges Audit Team competency
Vendor	NP or development and lifecycle process security inconsistency		Audit Team assessment disputed by vendor	Test lab refuses product evaluation or evaluation results are disputed by vendor	SCAS documentation ambiguous or not fit for purpose
Audit Team	Vendor assessment undertaken by Audit Team and challenged by operator	Audit Team assessment disputed by vendor			Audit Team has concerns about NESAS document quality
Test Lab		Test lab refuses product evaluation or evaluation results are disputed by vendor			SCAS documentation ambiguous or not fit for purpose
NESAS Oversight Board (OB)	Operator believes SCAS is inadequate or challenges Audit Team competency	SCAS documentation ambiguous or not fit for purpose	Audit Team has concerns about NESAS document quality	SCAS documentation ambiguous or not fit for purpose	

1. Example Dispute Scenarios

3.8.3.Matters outside the Scope of NESAS DRC

The NESAS DRP only deals with disputes in respect to the interpretation and implementation of NESAS or its documentation. Any dispute with regards to the facts, findings or recommendations of an evaluation report should be resolved between the respective NESAS Security Test Laboratory and Equipment Vendor.

3.8.4.Liability of the NESAS DRC Members

Any ruling by the NESAS DRC is undertaken “as is” with no liability (e.g. for the correctness nor for any damages caused by or resulting from any decision/ruling made by the NESAS DRC) to the GSMA, any NESAS DRC members, GSMA staff members or NESAS Oversight Board or GSMA members.

As a condition to invoking the NESAS DRP, the appellant agree to hold the GSMA and the aforementioned individuals involved in rendering a ruling/decision harmless from any and all liabilities or damages arising from or related to the appellants invocation of the NESAS Dispute Resolution Process and associated matters.



References

FS.14 [3], FS.15, FS.47 [7] and FS.50 [8] follow the NESAS dispute resolution process defined here. Stakeholders who raise a dispute need to follow this process.

3.9. Extent of NESAS

As illustrated above, the focus of NESAS is exclusively on network equipment. The scheme addresses the industry's needs and challenges by taking the following multifaceted approach:

1. Assessment of Vendor Development and Product Lifecycle Processes;
2. Network equipment product evaluation by competent NESAS security Test Laboratories using defined and standardised security tests.

To achieve the necessary balanced approach that is accepted by all stakeholders, certain aspects have been excluded from the initial scope and these are as follows:

1. There is no certification of Equipment Vendors or network equipment by an officially recognised authority.
2. It is generally acknowledged that the absence of undocumented functionality (e.g. backdoors, malware, etc.) cannot be proved in network equipment cannot be guaranteed and this is also the case for NESAS.
3. The scheme does not replace existing operator or national requirements.
4. The scheme is not intended to include security of interoperability and interworking between network equipment.
5. The scheme does not address the need for end-to-end security.

3.10. Governance

NESAS is governed by the provisions set out in FS.13 (this document), FS.14 [3], FS.15 [4], FS.16 [5], FS.47 [7] and FS.50 [8]. Save in the case of Section 3.8 in FS.13, in case of any conflict between FS.14 [3], FS.15 [4], FS.16 [5], FS.47 [7] and FS.50 [8] or any other provisions in other NESAS documentation, FS.14 [3], FS.15 [4], FS.16 [5], FS.47 [7] and FS.50 [8] shall prevail.

4. NESAS Benefits

NESAS brings a number of benefits for various stakeholders in the mobile industry and regulatory and user communities.

The level of security assurance, and as such the level of security resilience, achieved by network equipment, is measurable, visible, comparable and understood. MNOs benefit as this introduces transparency that helps MNOs determine if the network equipment of individual vendors meets the security requirements of the MNO. For vendors, this provides a platform to highlight the vendor's ability to achieve/maintain good security standards.

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Most vendors demonstrate a commitment to secure Vendor Development and Product Lifecycle Processes. This is beneficial for MNOs, since it increases trust in the vendor and confidence for MNOs when engaged in vendor selection decision making. In return, it encourages and rewards vendors to reinforce security in their products and it engenders a security-by-design culture across the entire vendor community.

Evaluation of network equipment, conducted by competent accredited and authorised Test Laboratories, allows MNOs determine the level of security of that equipment before it is deployed. Furthermore, it reduces the security testing burden on vendors, MNOs and interested regulators and national authorities.

While all stakeholders are free to set their individual security requirements, NESAS is designed to ensure a baseline security level and a common set of security requirements for all. Both vendors and MNOs will benefit from the reduced set of requirements, as requests for quotation processes and contract negotiations require less security requirements to be listed, considered and agreed. This should be significantly beneficial for Equipment Vendors as the overhead of dealing and responding to different, but similar, security requirements coming from various stakeholders is reduced.

With NESAS, a single Audit for the vendor replaces the need to host and fund Audits from individual operators and regulators, aimed at reducing overheads for the vendor.

One of the goals set by industry for NESAS is to demonstrate to regulators its value. If it can be shown that NESAS security requirements are commensurate with national security requirements in individual countries, national authorities are likely to endorse and support NESAS as a requirement for mobile network equipment deployments. This is beneficial for Equipment Vendors, since the overhead of satisfying different security requirements from individual regulators and countries is reduced. Therefore, NESAS is designed to interface well with regulatory frameworks, as further detailed in Section 6.

NESAS reuses mature accreditation models which deliver security gains and improvements whilst keeping work and costs for all stakeholders at manageable levels.

5. Involved Stakeholders, their Roles and Relationships

The stakeholders that are involved in NESAS, and their roles and relationships, are described in this section.

Mobile Network Operators (MNO), operate mobile networks. They are interested in operating a robust and reliable network which requires them to obtain robust and secure network equipment. MNOs are interested in obtaining NESAS evaluated Network Equipment (NE) from NESAS assessed vendors.

The network equipment used in mobile networks, such as the radio base stations, Internet gateways, etc. are developed and provided by **Network Equipment Vendors**. Network equipment vendors have predefined secure Vendor Development and Product Lifecycle Processes by which they create and produce their network equipment.

NESAS Security Test laboratories are contracted to perform network equipment security evaluations as defined by NESAS.

The **GSMA** has multiple roles in NESAS:

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1. The **NESAS Group** and **Industry Specification Approval Group (ISAG)** of the GSMA are the approval bodies within the GSMA for all NESAS documentation.
2. The **NESAS Oversight Board** shall have overall responsibility for Audit quality control.
3. The **NESAS Dispute Resolution Committee** is established whenever a dispute is to be resolved according to the NESAS defined processes.
4. **GSMA staff** manage and operate NESAS on a daily basis providing support to the **NESAS Oversight Board**.

3GPP SA3 defines the Security Assurance Specifications (SCAS) for the 3GPP defined Network Functions. SA3 also defines the methodology by which SA3 defines SCASes.

A **Standards Development Organisation (SDO)** defines its Network Functions and the corresponding Security Assurance Specifications (SCAS).

The GSMA appointed **Independent Audit Team** performs Audits of network equipment Vendors' Vendor Development and Product Lifecycle Processes, as defined by NESAS.

A national **ISO/IEC 17025 Accreditation Body (IAB)** accredits test laboratories upon request against ISO/IEC 17025 in the context of NESAS.

The ISO/IEC 17025 Accreditation Body is supported by a **Subject Matter Expert (SME)** who is experienced in all the NESAS related technical details, such as mobile networks, network and equipment security, and testing of network equipment and network services.

Relationships between the stakeholders listed above are illustrated in Table 2 below. The table is to be read beginning with an item in the first column, then a cell in the same row, and then the corresponding item in the first row. Example: NESAS Oversight Board appoints Auditor Team. See Figure 11.

	Audit Team
NESAS Oversight Board (AB)	Appoints and assigns disputes to

How to read the following table:

Order of reading:
Item in left column → cell → item in top row.

Example: NESAS Oversight Board → appoints → Audit Team

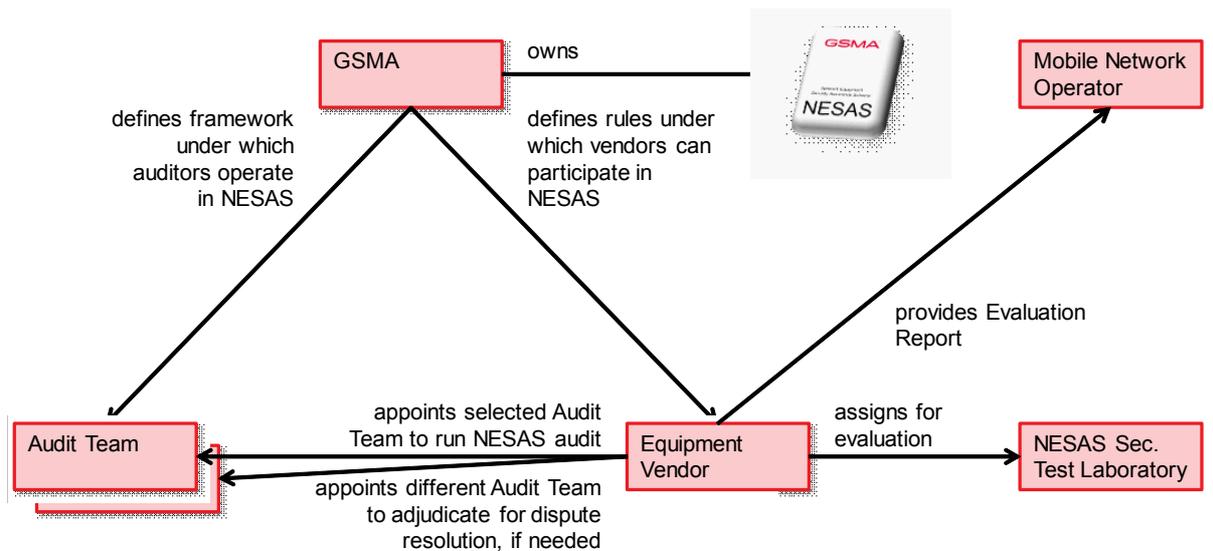
11. Explanation of how to read the table below

	MNO	Vendor	Test Lab	GSMA NESASG	NESAS OB	NESAS DRC	GSMA	3GPP SA3 or another SDO	Auditing Organisation/Audit Team	IAB	SME
Mobile Network Operator (MNO)		Obtains evaluated Network Product		Can be member of	Can be member of	Can raise disputes to		Can be member of			
Equipment Vendor	Sells Network Product to		Assigns for Network Product evaluation	Can be member of	Can be member of	Can raise disputes to		Can be member of	Selects and is audited by		

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NESAS Security Test Laboratory (Lab)		Performs Network Product evaluation for				Can raise disputes to				Is accredited by	Is audited by
GSMA NESAS Group (NESASG)	Has members from	Has members from			Establishes			Collaboratively develops NESAS with			
NESAS Oversight Board (OB)	Has members from	Records participation of					Is supported by		Appoints and assigns disputes to		
NESAS Dispute Resolution Committee (DRC)	Handles disputes with	Handles disputes with	Handles disputes with		Forwards decisions to		Forwards decisions to		Handles disputes with		
GSMA		Maintains status of	Maintains status of		Supports	Supports			Coordinates	Is available for inquiries from	Is available for inquiries from
3GPP SA3 or another SDO	Has members from	Has members from		Collaboratively develops NESAS with							
Auditing Organisation/ Audit Team		Audits and adjudicates on disputes				Can raise disputes to	RIs appointed by and reports to				
ISO/IEC 17025 Accreditation Body (IAB)			Accredits								Collaborates with
Subject Matter Expert			Audits							Collaborates with	

2. Relationships between Stakeholders



12. Relationships between NESAS Participants

6. Status of NESAS Development and Outlook

NESAS has been released in its second official release. It is called “NESAS Release 2”. All NESAS documents (FS.13 (this document), FS.14 [3], FS.15 [4], FS.16 [5], FS.46 [6], FS.47 [7] and FS.50 [8]) in a particular version comprise a NESAS Release. The official NESAS Web Site [12] provides a mapping of NESAS Releases to NESAS documentation, recognising that Release numbering and document version numbering are distinct and independent of each other. For that reason, each NESAS document will clearly state which Release(s) it applies to and this information is presented in a table in a document annex.

Subsequent NESAS publications after Release 2.0 use a versioning system by which every NESAS document (FS.13 (this document), FS.14 [3], FS.15 [4], FS.16 [5], FS.46 [6], FS.47 [7] and FS.50 [8]) will have its own version number, which will only change when there are changes made to each particular specification. The concept of NESAS Release cycles is no longer followed.

NESAS is designed to be improved iteratively. All the lessons learnt from the application of NESAS will be considered and reflected in future versions. Updated NESAS documentation will take feedback from the various stakeholders into account and will also strengthen NESAS’s ability to support Equipment Vendors to deliver continual security improvements. This facilitates and encourages stakeholders to get involved in order to help develop the scheme in a way that it satisfies their needs. Equipment Vendors that have had their processes assessed will be able to offer more secure network equipment which will benefit the mobile ecosystem.

Future NESAS documentation updates are either minor or major. Updates with minor changes are indicated by an increment of the version number behind the dot, whereas major changes increment the version number before the dot, i.e. if a NESAS document version x.y is the current version, a minor version will be numbered x.y+1 and a major version will be numbered x+1.0.

Major and minor changes are distinguished as follows.

Minor NESAS changes are those that meet at least one of the following criteria:

- Editorial changes
- Error corrections, additions or modifications that provide clarity on matters previously unclear.
- Changes to informative content that do not result in material changes to the intent of the existing NESAS scheme and its documentation.
- Is not classified as a major change.

NOTE: Assessments that have been conducted against the major versions of FS.15 [4] and FS.16 [5] remain valid after minor versions of these documents have been published.

Major NESAS changes are those that meet at least one of the following criteria:

- The scope has changed due to the addition, removal or material modification of requirements, procedures or any other content that covers aspects not covered previously in NESAS.

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- Modification of content that materially changes the intent of the existing scheme and its documentation.

NOTE: After a major version of FS.15 [4] and/or FS.16 [5] has been published, assessments that have been conducted against the previous major versions remain valid but only against these versions. To achieve currency and relevancy to the latest NESAS documentation, assessments will need to be undertaken against the prevailing NESAS documentation.

The current status of NESAS development and the latest versions of the NESAS documents can be obtained from the official NESAS Web Site [13].

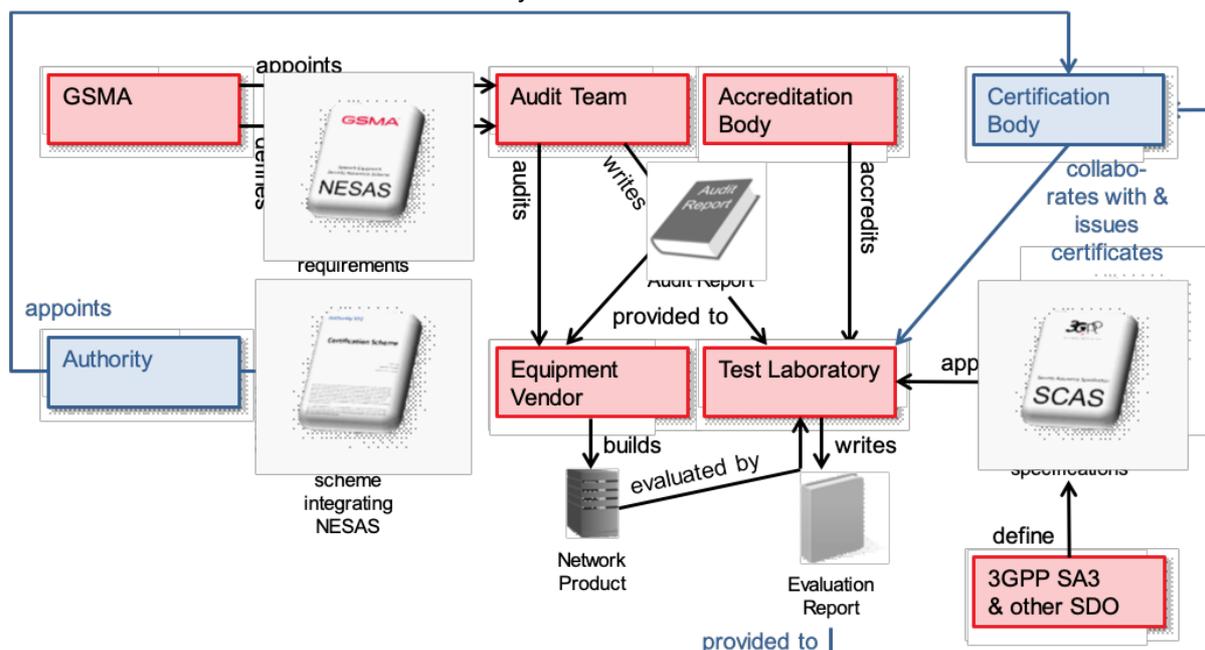
If it is determined necessary in the future, the scope of NESAS can be extended and additional security requirements can be added to existing specifications. New network equipment types can be added to the scheme by producing and approving new corresponding SCASes. Additionally, Equipment Vendor Development and Product Lifecycle process assessment and NESAS Security Test Laboratory accreditation can be extended by adding/modifying requirements as considered necessary.

NESAS is designed to be recognised and adopted by regulatory authorities and the scheme provides the methodology, security requirements and security test cases necessary to support a robust security framework. In its current construction, NESAS does not include vendor or product certification, but does include the enablers for a certification scheme to be developed, if considered necessary, by nation states. In designing a certification scheme, the existing NESAS-defined

- Auditing Organisation appointment,
- Test Laboratory accreditation,
- Vendor processes and Network Product-related security requirements, and
- the vendor processes assessment and product evaluation methodologies

can all be used. Thus, the only enabler that would need to be developed to support certification, is the establishment of a Certification Body and its related functions. An example of how NESAS could be augmented by the addition of certification elements and responsibilities, is illustrated in Figure 13.

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13. Example adoption of NESAS by a regulatory initiative with certification added

Although NESAS originated as an industry initiative, it has been developed with the needs of national authorities in mind. NESAS provides a global security baseline and assurance framework that, if supported, will avoid the risk of fragmentation and will ensure the scheme and its objective of delivering real security improvement will succeed. Stakeholders interested in NESAS and adopting it are invited to contact nesas@gsma.com.

A. Document Management

A.1. Document History

Version	Date	Brief Description of Change	Approval Authority	Editor / Company
1.0	Sep 2019	Release 1 approved by SECAG	GSMA TG	James Moran / GSMA
1.1	Aug 2020	Minor clarifications added	GSMA FASG	James Moran / GSMA
2.0	Feb 2021	Changes made to reflect changes to other scheme documents FS.14, FS.15 and FS.16	GSMA FASG	James Moran / GSMA
2.1	Jan 2022	Changes made to reflect changes to other scheme documents FS.14 and FS.47. Migrating from NESAS Release to version numbering system for NESAS documentation. Addition of provisions pertaining to the licensing of NESAS documentation.	GSMA FASG	James Moran / GSMA
2.2	Oct 2022	Changes made to facilitate the introduction of fees and contract changes to place NESAS on a sustainable financial footing.	GSMA ISAG	James Moran / GSMA
2.3	Jul 2023	Adding other SDOs to 3GPP as potential authors and maintainers of SCASes. Reference to new NESAS document FS.50 on SCAS development guidelines added. Minor editorial corrections and consistencies made.	GSMA ISAG	James Moran / GSMA

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b) properly references the GSMA document and any extracts thereof in;

its own documentation.

A.3. Other Information

Type	Description
Document Owner	GSMA NESASG
Editor / Company	James Moran / GSMA

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