STIR/SHAKEN LI enhancements - Part I (background)

Nagaraja (Nag) Rao; Boca Raton, FL

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STIR/SHAKEN LI & IMS LI (general)

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Originating CSP – Normal IMS LI and STIR/SHAKEN LI combined view (target local)

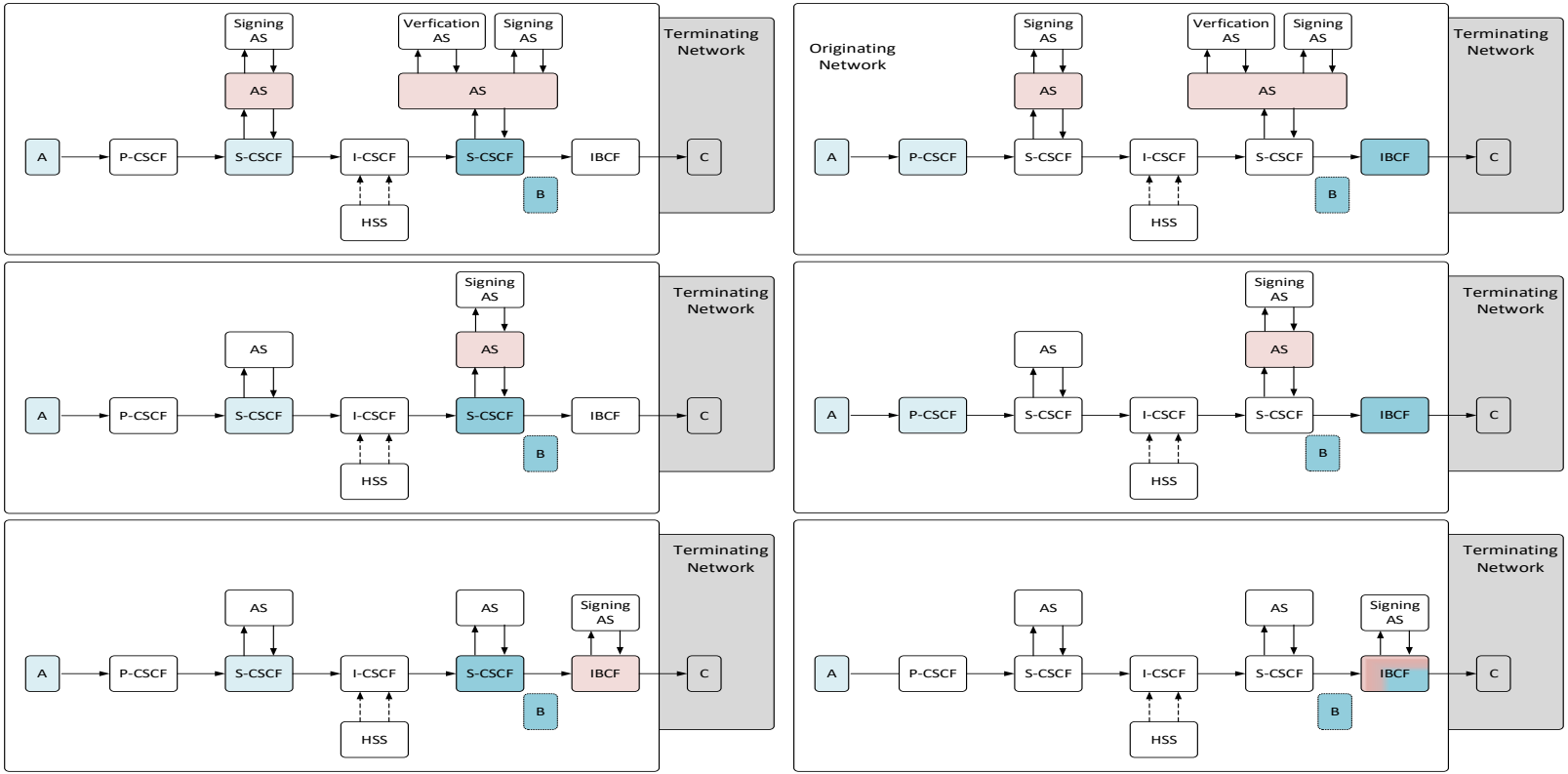
Default for IMS LI (TS 33.127/TS 33.128)

Alternate for IMS LI (TS 33.127/TS 33.128)

Signing for Intra-CSP

Signing for Inter-CSP (AS)

Signing for Inter-CSP (IBCF)



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Terminating CSP – Normal IMS LI and STIR/SHAKEN LI combined view (target local)

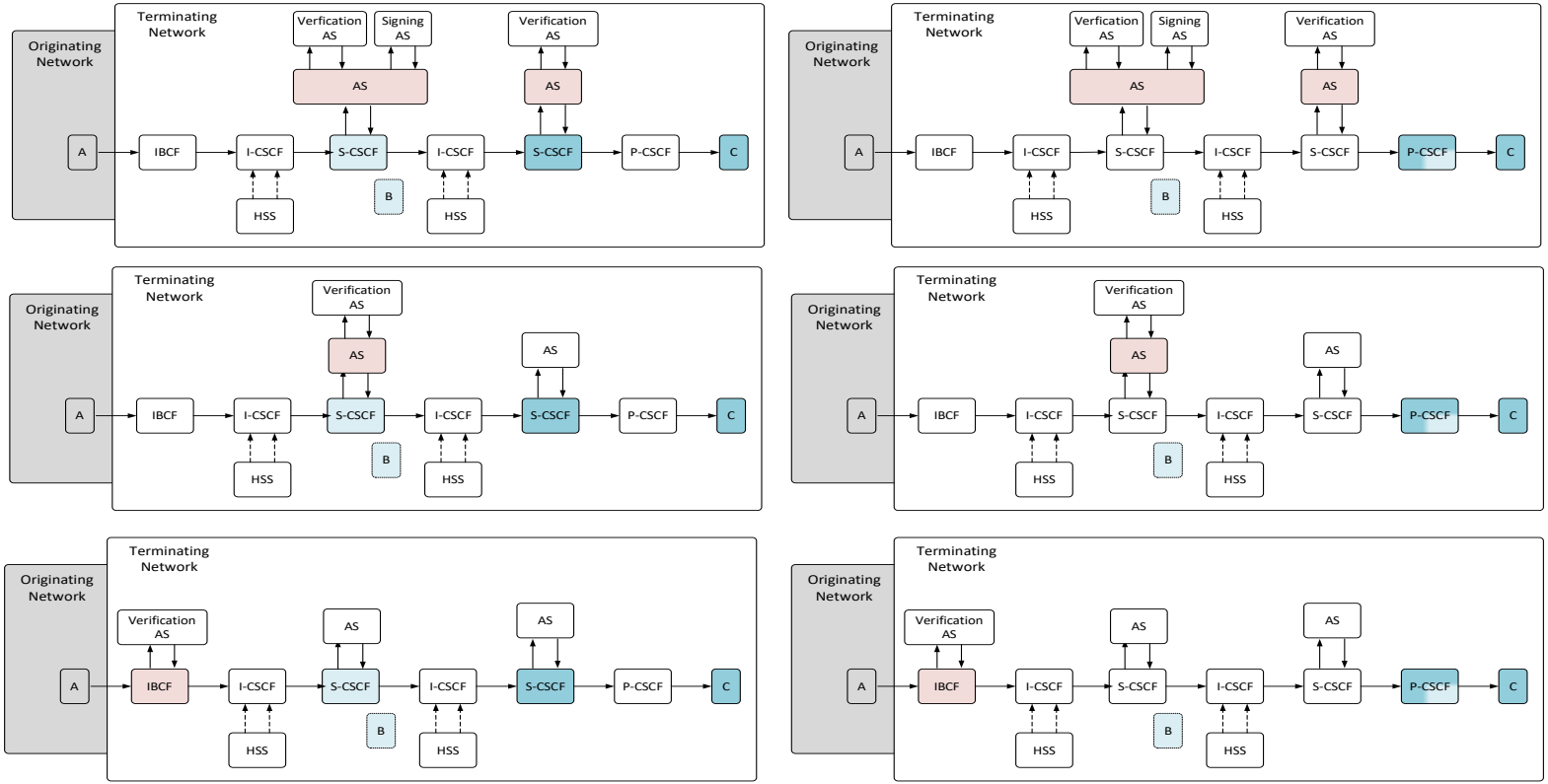
Default for IMS LI (TS 33.127/TS 33.128)

Alternate for IMS LI (TS 33.127/TS 33.128)

Signing for Intra-CSP

Signing for Inter-CSP (AS)

Signing for Inter-CSP (IBCF)



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Originating CSP – Normal IMS LI and STIR/SHAKEN LI combined view (target non-local ID)

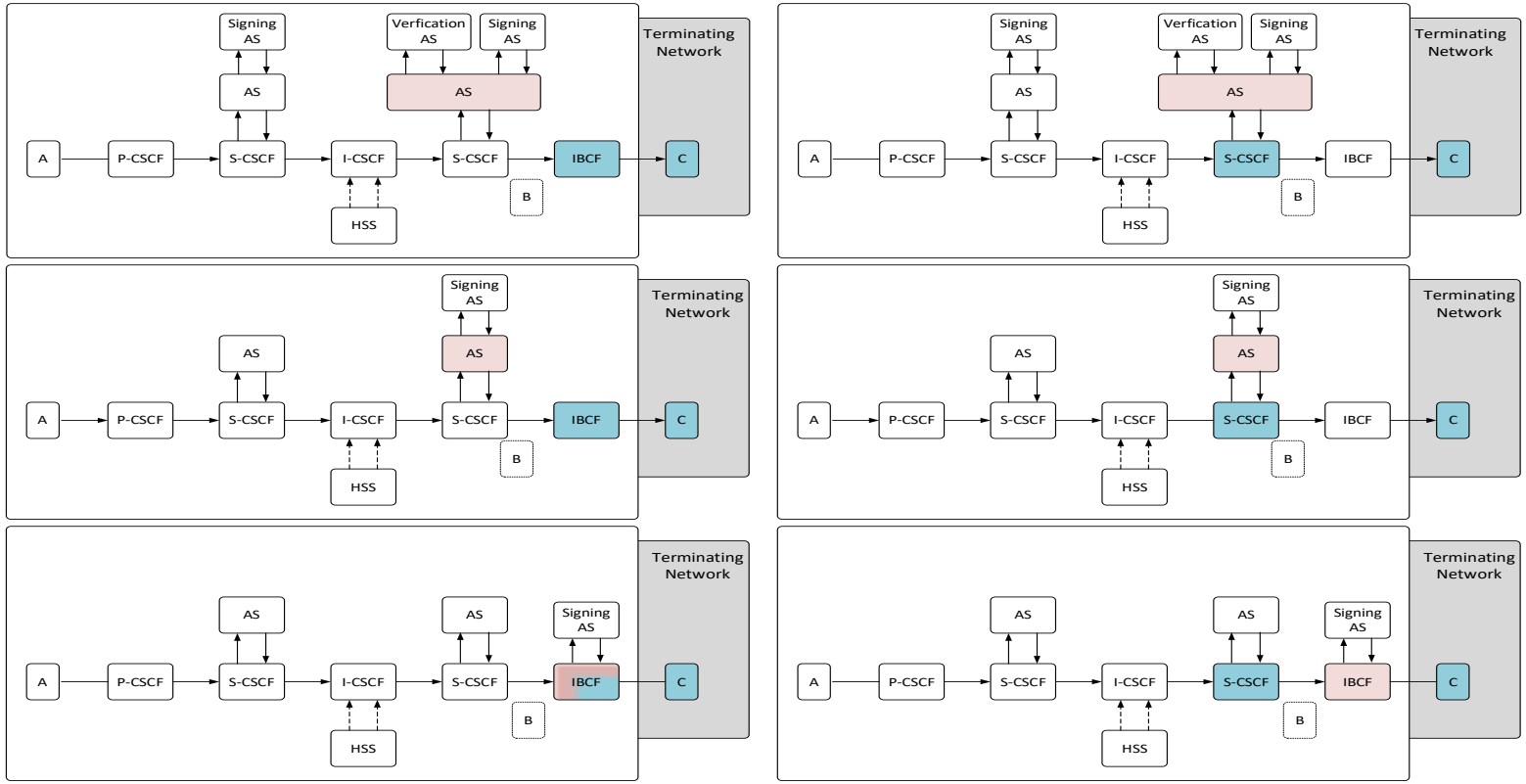
Default for IMS LI (TS 33.127/TS 33.128)

Alternate for IMS LI (TS 33.127/TS 33.128)

Signing for Intra-CSP

Signing for Inter-CSP (AS)

Signing for Inter-CSP (IBCF)



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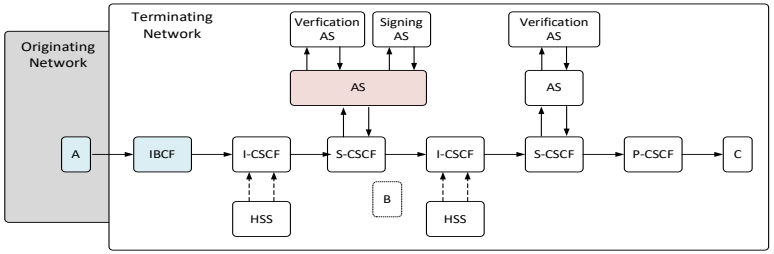
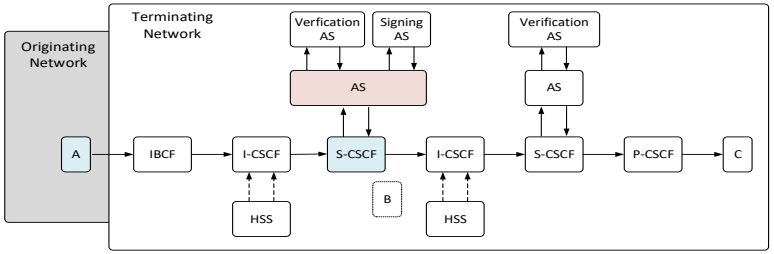
Terminating CSP – Normal IMS LI and STIR/SHAKEN LI combined view (target non-local ID)

Default for IMS LI (TS 33.127/TS 33.128)

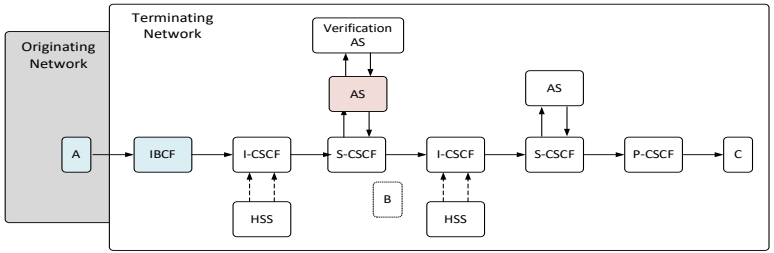
Alternate for IMS LI (TS 33.127/TS 33.128)

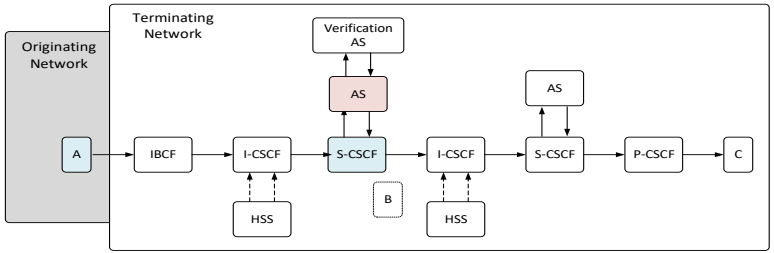
Signing for Intra-CSP



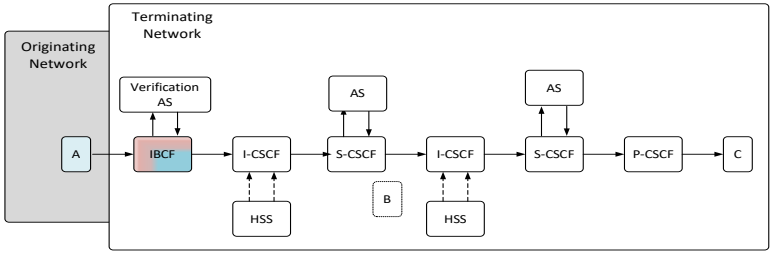


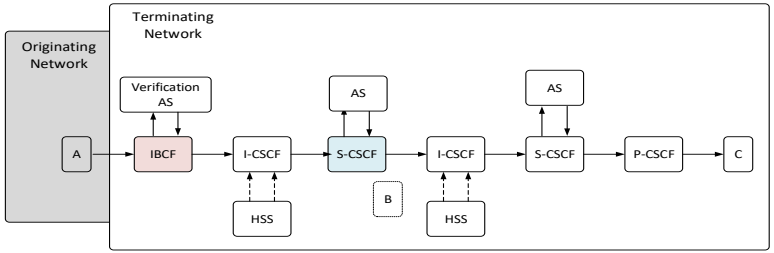
Signing for Inter-CSP (AS)





Signing for Inter-CSP (IBCF)





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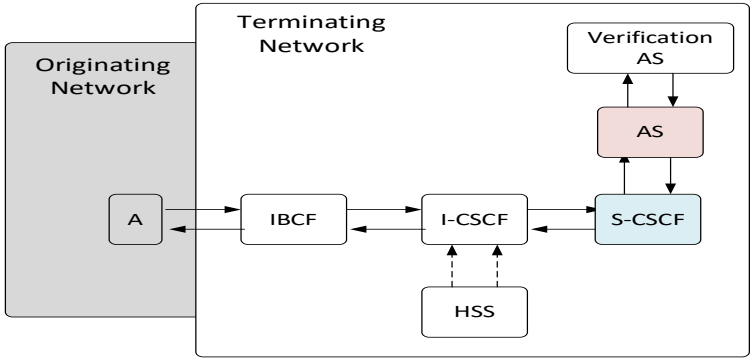
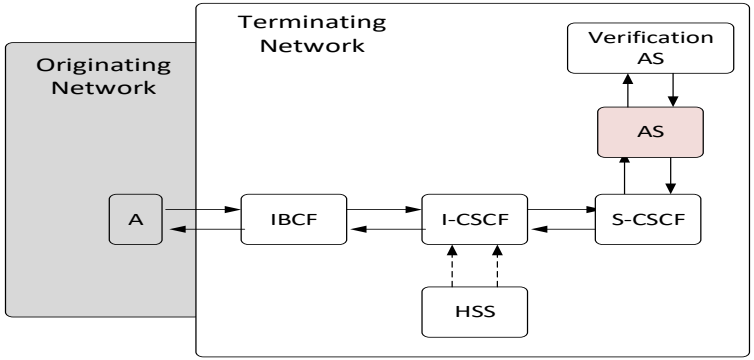
Terminating CSP – Normal IMS LI and STIR/SHAKEN LI combined view
Validation fails – local target

Default for IMS LI (TS 33.127/TS 33.128)

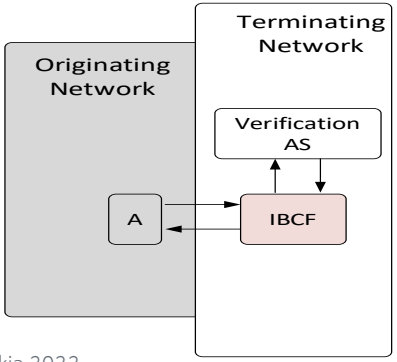
Alternate for IMS LI (TS 33.127/TS 33.128)

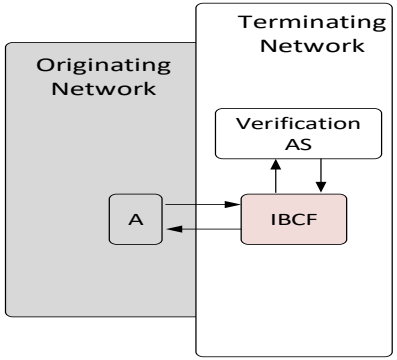
AS





IBCF





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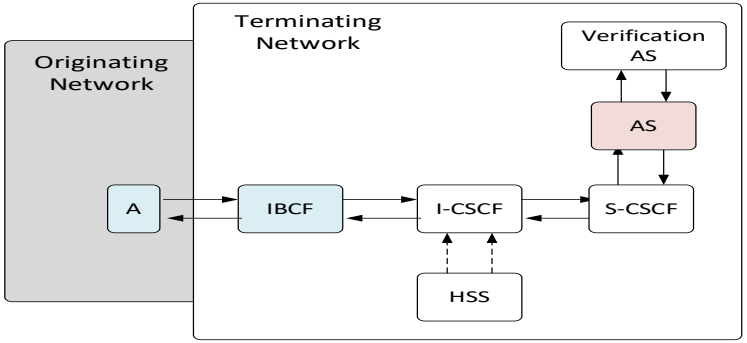
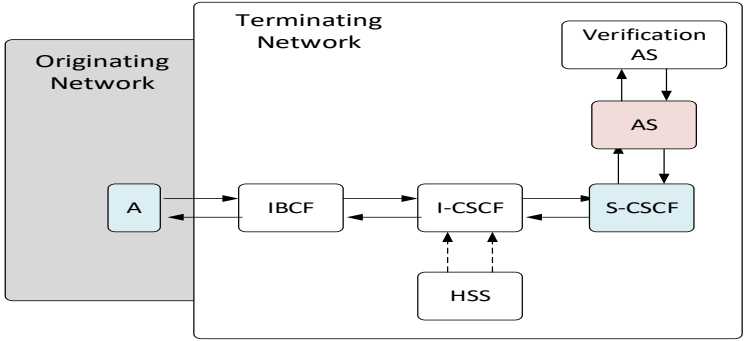
Terminating CSP – Normal IMS LI and STIR/SHAKEN LI combined view
Validation fails – target non-local ID

Default for IMS LI (TS 33.127/TS 33.128)

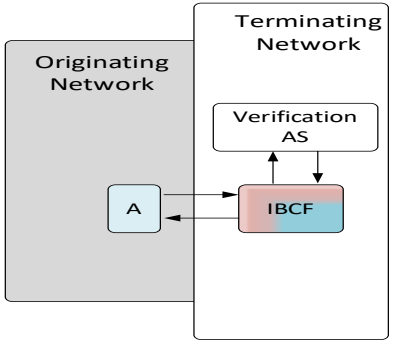
Alternate for IMS LI (TS 33.127/TS 33.128)

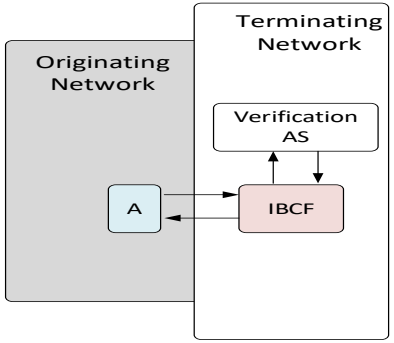
AS





IBCF





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STIR/SHAKEN aspects (non-LI)

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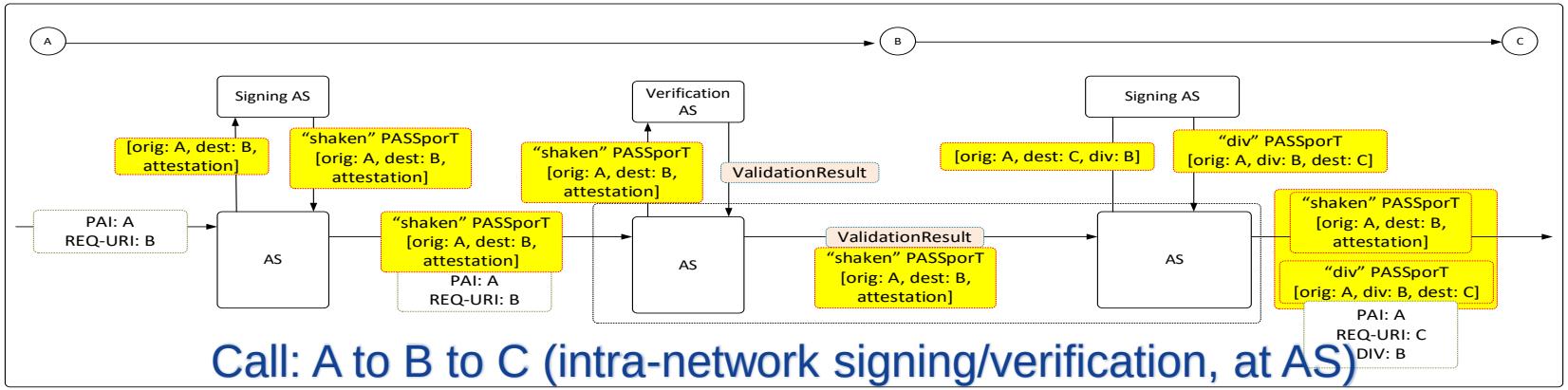
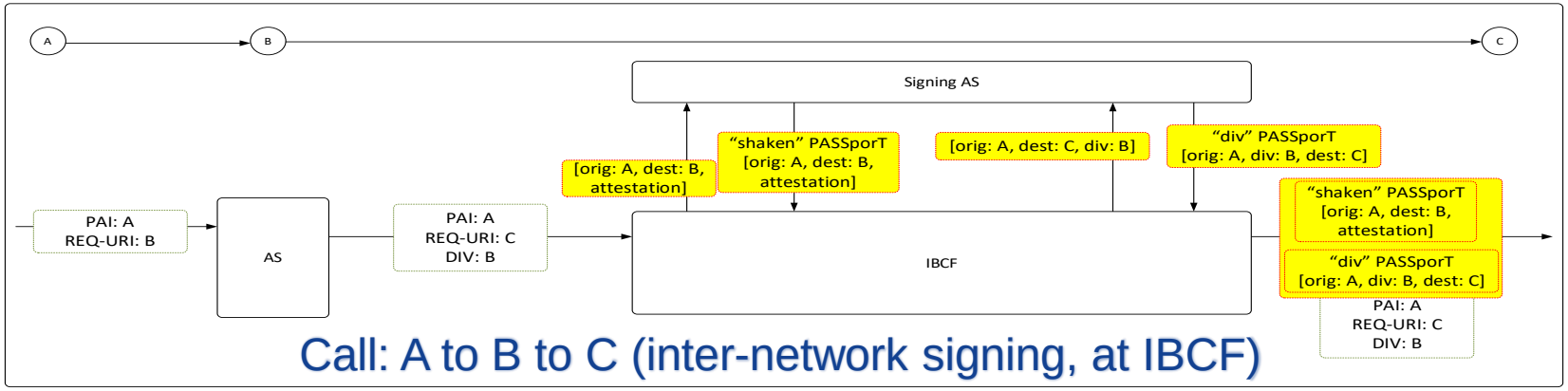
Interactions with Signing AS or Verification AS



Call: A to B to C (intra-network signing/verification, at AS)



Call: A to B to C (inter-network signing, at IBCF)

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TS 33.128 Reference and Interpretation

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TS 33.128 (clause 7.11.1.1)

The LIPF uses the following logic to provision the IRI-POI present in the Telephony AS or IBCF for the reporting of signing and verification results:

- If signing of RCD is required in the network, then Telephony AS shall be provisioned for the reporting of RCD/eCNAM related signature.
- If the signing of intra-CSP sessions is required, then Telephony AS is provisioned for the reporting of STIR/SHAKEN related signature.
- If the signing of RCD is not required, then the IBCF shall be provisioned for the reporting of STIR/SHAKEN related signature.
- If verification of RCD is required in the network, then Telephony AS shall be provisioned.
- When signing applies only for inter-CSP SMS related to a destination only identified by a SIP address (i.e. MSISDN-less SMS), IBCF is provisioned.
- When verification applies only for inter-CSP MSISDN-less SMS, IBCF is provisioned.
- The LMISF-IRI or P-CSCF are provisioned.

NOTE: LMISF-IRI is considered Point of Interception of all SIP INVITE or SIP MESSAGE messages in which STIR/SHAKEN and RCD/eCNAM messages are available.

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TS 33.128 (clause 7.11.2.2) – Originating end

The IRI-POI present in the Telephony AS or IBCF, shall generate an xIRI containing a STIRSHAKENSignatureGeneration record when the following conditions are met:

- Telephony AS or IBCF is interacting with the SIGNING AS. Whether it is the Telephony AS or IBCF for sessions is based on network configuration and local policy of the CSP. Whether it is IBCF for MSISDN-less SMS is based on network configuration and local policy of the CSP.
- P-Asserted Identity or From header of SIP INVITE or SIP MESSAGE request received from S-CSCF is a target identity.
- A PASSporT is received from the SIGNING AS and is included in an outgoing SIP INVITE or SIP MESSAGE request in a SIP Identity header.
- Based on RFC 8946 [76], SIP retargeting creates a new Identity header signed by the SIGNING AS and containing the "div" claim to attach to the session.

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TS 33.128 (clause 7.11.2.3) – Terminating end

The IRI-POI present in the Telephony AS or IBCF, shall generate an xIRI containing a STIRSHAKENSignatureValidation record when the following conditions are met:

- Either IBCF or Telephony AS, is interacting with the VERIFICATION AS. Whether it is the Telephony AS or IBCF for sessions is based on network configuration and local policy of the CSP. IBCF for MSISDN-less SMS, is based on network configuration and local policy of the CSP.
- Request URI and To Headers of SIP INVITE or SIP MESSAGE request received from S-CSCF (in the case of Telephony AS) or from the previous IP network (in the case of IBCF) is a target identity.
- If a PASSporT is received in the SIP INVITE or SIP MESSAGE request, it is submitted by the Telephony AS or IBCF to the VERIFICATION AS for validation and the result is included in an outgoing SIP INVITE or SIP MESSAGE request together with possible RCD data or eCNAM data as Call-Info headers.

The IRI-POI present in the LMISF-IRI or P-CSCF shall generate an xIRI containing a STIRSHAKENSignatureValidation record when the following conditions are met:

- Request URI or To header of SIP INVITE or SIP MESSAGE request sent to the UE is a target identity.
- SIP INVITE or SIP MESSAGE request sent to the UE includes SIP Call-Info headers containing possible RCD data or eCNAM data, and the result of the PASSporT verification.

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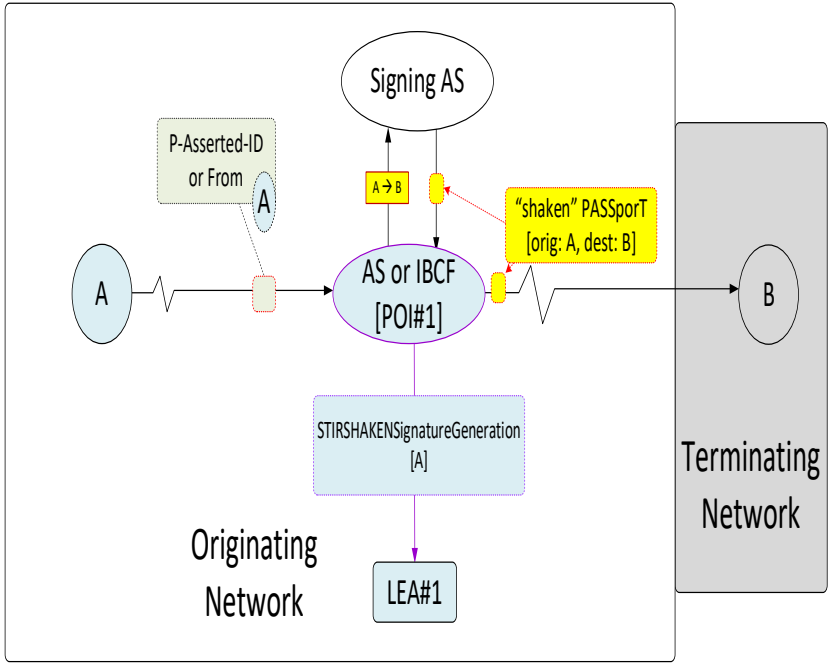
TS 33.128 in figures (originating end)



Clause 7.11.2.2

The IRI-POI present in the Telephony AS or IBCF, shall generate an xIRI containing a STIRSHAKENSignatureGeneration record when the following conditions are met:

- Telephony AS or IBCF is interacting with the SIGNING AS. Whether it is the Telephony AS or IBCF for sessions is based on network configuration and local policy of the CSP. Whether it is IBCF for MSISDN-less SMS is based on network configuration and local policy of the CSP.
- P-Asserted Identity or From header of SIP INVITE or SIP MESSAGE request received from S-CSCF is a target identity.
- A PASSporT is received from the SIGNING AS and is included in an outgoing SIP INVITE or SIP MESSAGE request in a SIP Identity header.
- Based on RFC 8946 [76], SIP retargeting creates a new Identity header signed by the SIGNING AS and containing the "div" claim to attach to the session.

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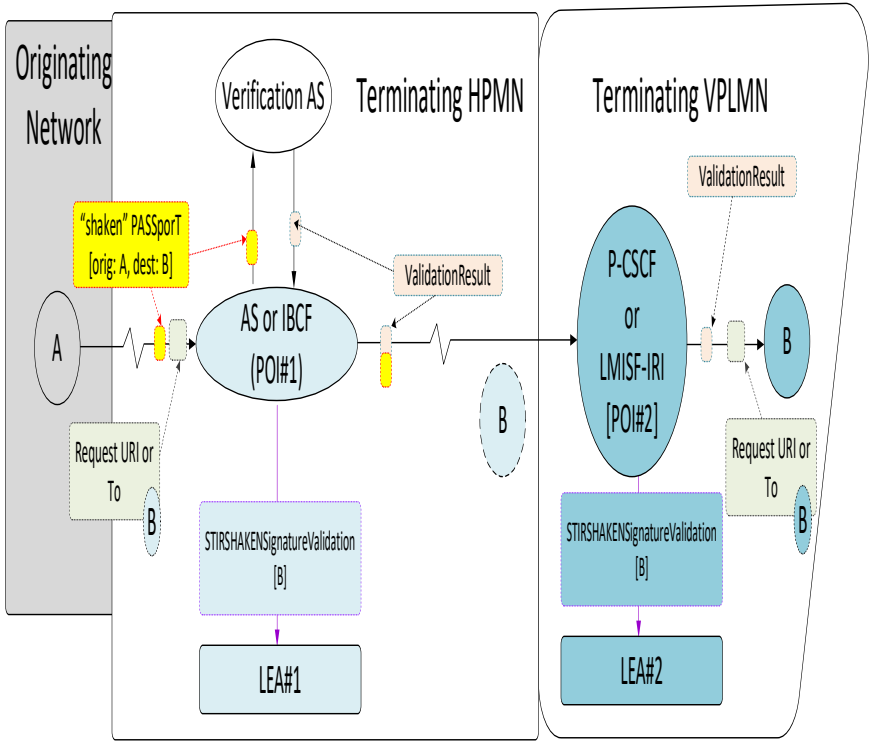
TS 33.128 in figures (terminating end)



Clause 7.11.2.3

The IRI-POI present in the Telephony AS or IBCF, shall generate an xIRI containing a STIRSHAKENSignatureValidation record when the following conditions are met:

- Either IBCF or Telephony AS, is interacting with the VERIFICATION AS. Whether it is the Telephony AS or IBCF for sessions is based on network configuration and local policy of the CSP. IBCF for MSISDN-less SMS, is based on network configuration and local policy of the CSP.
- Request URI and To Headers of SIP INVITE or SIP MESSAGE request received from S-CSCF (in the case of Telephony AS) or from the previous IP network (in the case of IBCF) is a target identity.
- If a PASSporT is received in the SIP INVITE or SIP MESSAGE request, it is submitted by the Telephony AS or IBCF to the VERIFICATION AS for validation and the result is included in an outgoing SIP INVITE or SIP MESSAGE request together with possible RCD data or eCNAM data as Call-Info headers.

The IRI-POI present in the LMISF-IRI or P-CSCF shall generate an xIRI containing a STIRSHAKENSignatureValidation record when the following conditions are met:

- Request URI or To header of SIP INVITE or SIP MESSAGE request sent to the UE is a target identity.
- SIP INVITE or SIP MESSAGE request sent to the UE includes SIP Call-Info headers containing possible RCD data or eCNAM data, and the result of the PASSporT verification.

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Problems

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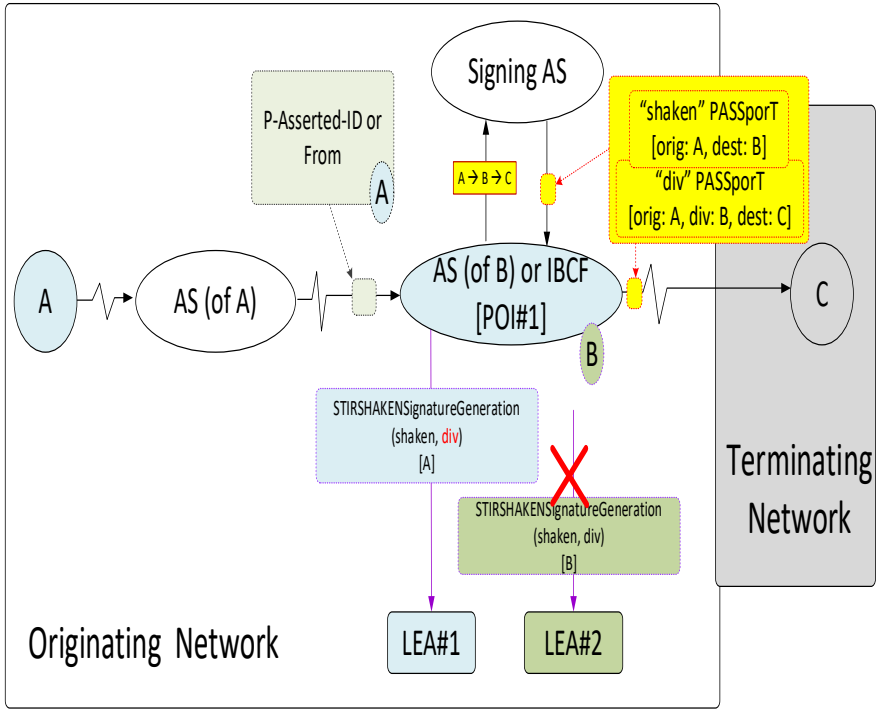
Scenario 1: A (target) calls B (target) redirected to C
Intra-CSP sessions are not signed/verified



Clause 7.11.2.2

The IRI-POI present in the Telephony AS or IBCF, shall generate an xIRI containing a STIRSHAKENSignatureGeneration record when the following conditions are met:

- Telephony AS or IBCF is interacting with the SIGNING AS. Whether it is the Telephony AS or IBCF for sessions is based on network configuration and local policy of the CSP. Whether it is IBCF for MSISDN-less SMS is based on network configuration and local policy of the CSP.
- P-Asserted Identity or From header of SIP INVITE or SIP MESSAGE request received from S-CSCF is a target identity.
- A PASSporT is received from the SIGNING AS and is included in an outgoing SIP INVITE or SIP MESSAGE request in a SIP Identity header.
- Based on RFC 8946 [76], SIP retargeting creates a new Identity header signed by the SIGNING AS and containing the "div" claim to attach to the session.

- B's LEA won't receive the STIRSHAKENSignatureGeneration.
- A's LEA will receive PASSporT information about B as well.

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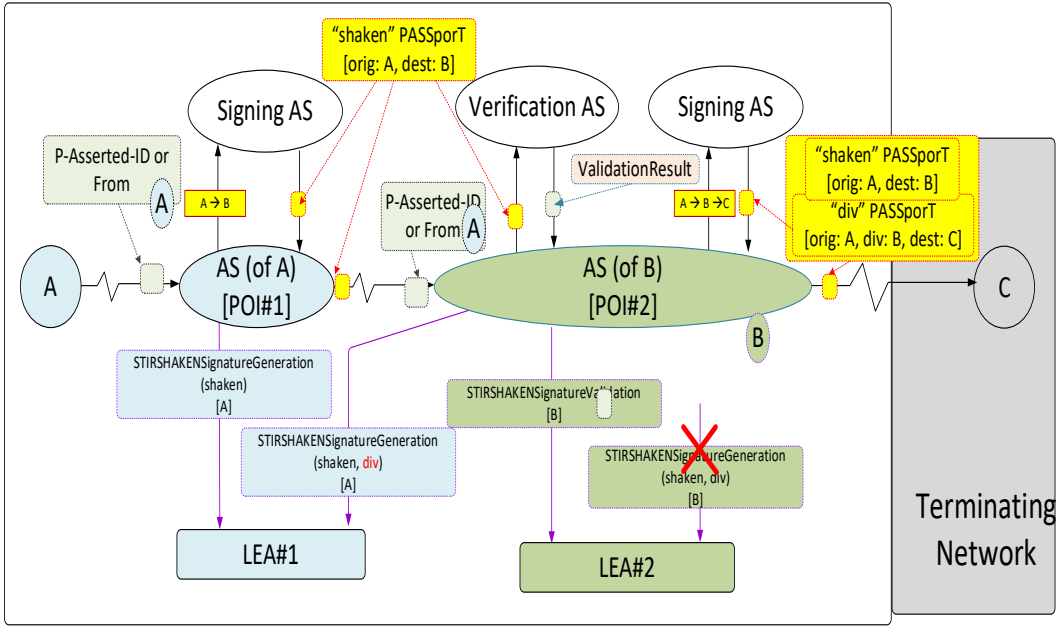
Scenario 2: A (target) calls B (target) redirected to C
Intra-CSP sessions are signed/verified



Clause 7.11.2.2

The IRI-POI present in the Telephony AS or IBCF, shall generate an xIRI containing a STIRSHAKENSignatureGeneration record when the following conditions are met:

- Telephony AS or IBCF is interacting with the SIGNING AS. - P-Asserted Identity or From header of SIP INVITE or SIP MESSAGE request received from S-CSCF is a target identity.
- A PASSporT is received from the SIGNING AS and is included in an outgoing SIP INVITE or SIP MESSAGE request in a SIP Identity header.
- Based on RFC 8946 [76], SIP retargeting creates a new Identity header signed by the SIGNING AS and containing the "div" claim to attach to the session.

- B's LEA won't receive the STIRSHAKENSignatureGeneration.
- A's LEA will receive STIRSHAKENSignatureGeneration, twice, the second one with PASSporT information about B as well.

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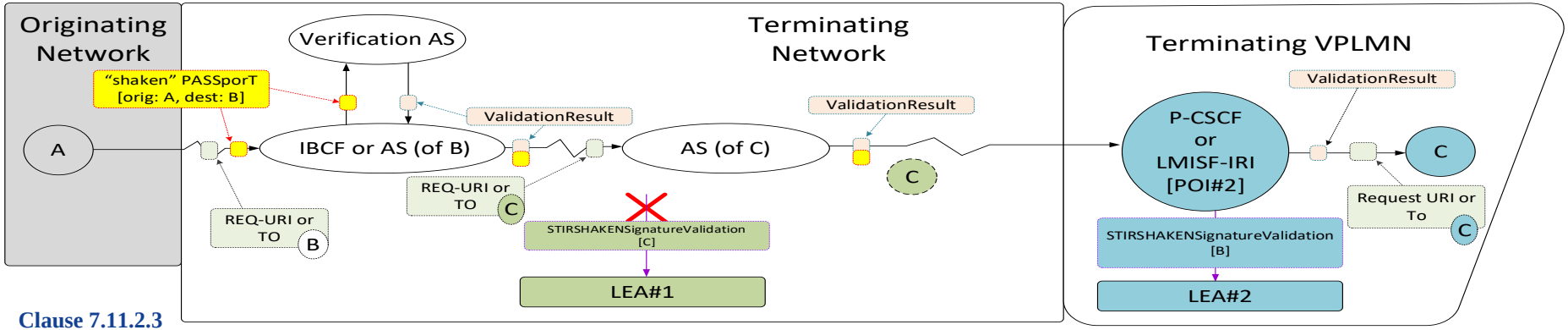
Scenario 3: A calls B redirected to C (target) Intra-CSP sessions are not signed/verfied

- In IBCF or AS (of B), B is the Request URI and TO. But, B is not a target.
- AS (of C) is not interacting with the Verification AS.
- No STIRSHAKENSignatureValidation to C's LEA.



Clause 7.11.2.3

The IRI-POI present in the Telephony AS or IBCF, shall generate an xIRI containing a STIRSHAKENSignatureValidation record when the following conditions are met:

- Either IBCF or Telephony AS, is interacting with the VERIFICATION AS. Whether it is the Telephony AS or IBCF for sessions is based on network configuration and local policy of the CSP. IBCF for MSISDN-less SMS, is based on network configuration and local policy of the CSP.
- Request URI and To Headers of SIP INVITE or SIP MESSAGE request received from S-CSCF (in the case of Telephony AS) or from the previous IP network (in the case of IBCF) is a target identity.
- If a PASSporT is received in the SIP INVITE or SIP MESSAGE request, it is submitted by the Telephony AS or IBCF to the VERIFICATION AS for validation and the result is included in an outgoing SIP INVITE or SIP MESSAGE request together with possible RCD data or eCNAM data as Call-Info headers.

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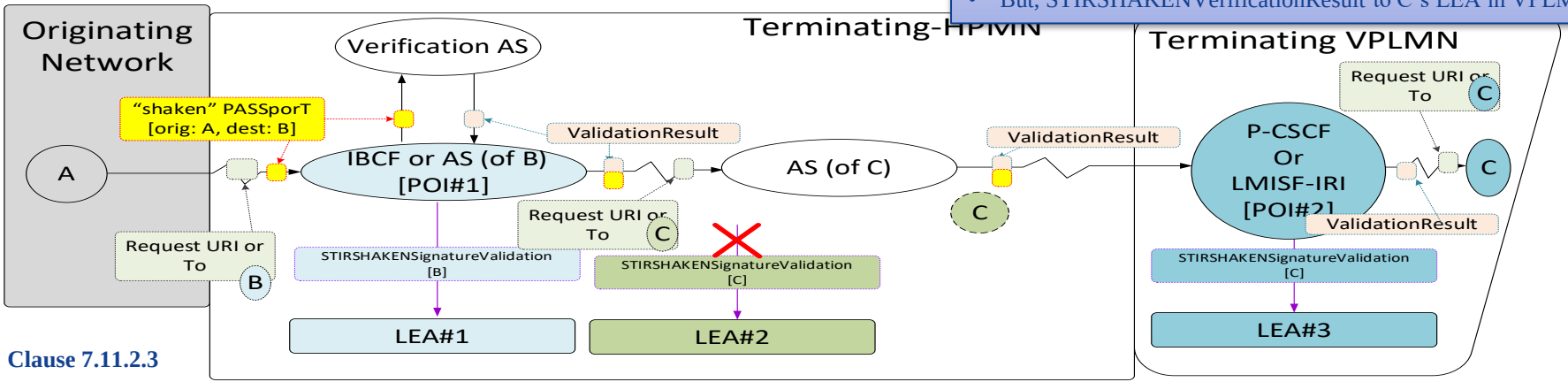
Scenario 4: A calls B (target) redirected to C (target) Intra-CSP sessions are not signed/verified

- In IBCF or AS (of B), B is the Request URI and TO.
- AS (of C) is not interacting with the Verification AS.
- No STIRSHAKENVerificationResult to C's LEA in HPLMN.
- But, STIRSHAKENVerificationResult to C's LEA in VPLMN.



Clause 7.11.2.3

The IRI-POI present in the Telephony AS or IBCF, shall generate an xIRI containing a STIRSHAKENSignatureValidation record when the following conditions are met:

- Either IBCF or Telephony AS, is interacting with the VERIFICATION AS.
- Request URI and To Headers of SIP INVITE or SIP MESSAGE request received from S-CSCF (in the case of Telephony AS) or from the previous IP network (in the case of IBCF) is a target identity.
- If a PASSporT is received in the SIP INVITE or SIP MESSAGE request, it is submitted by the Telephony AS or IBCF to the VERIFICATION AS for validation and the result is included in an outgoing SIP INVITE or SIP MESSAGE request together with possible RCD data or eCNAM data as Call-Info headers.

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