Evolved Intelligence

Innovation in an interconnected world

Identifying and managing the issues around 5G interconnect security

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- Leaders in 2G/3G and 4G signalling firewall
- Leaders in roaming value added services and analytics
- Supply both
  - Interconnect/IPX providers (e.g. Syniverse, Comfone etc)
  - Operators (e.g. DTAG, Orange, Vodafone etc)
- Active in GSMA

Security threats

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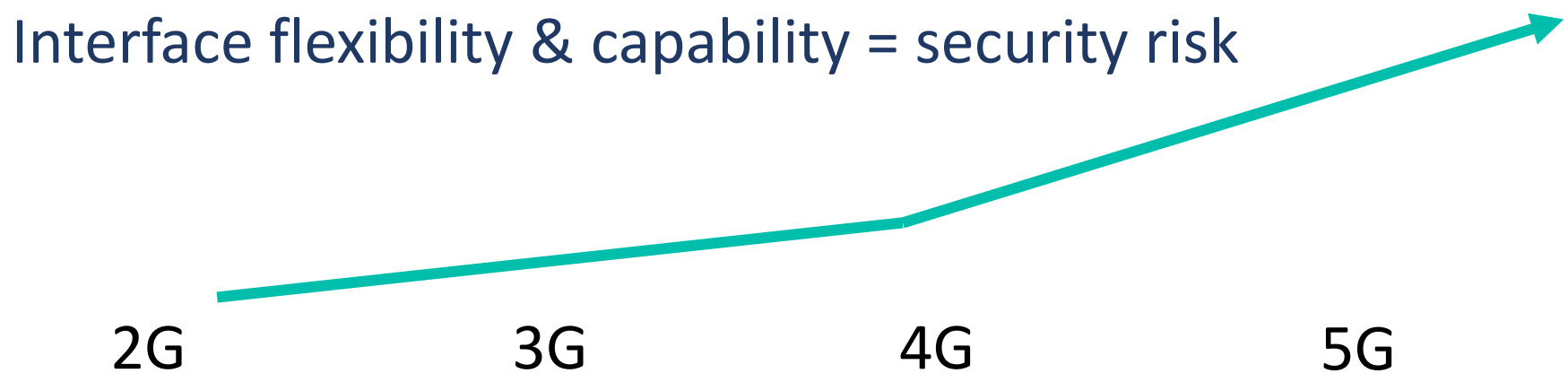
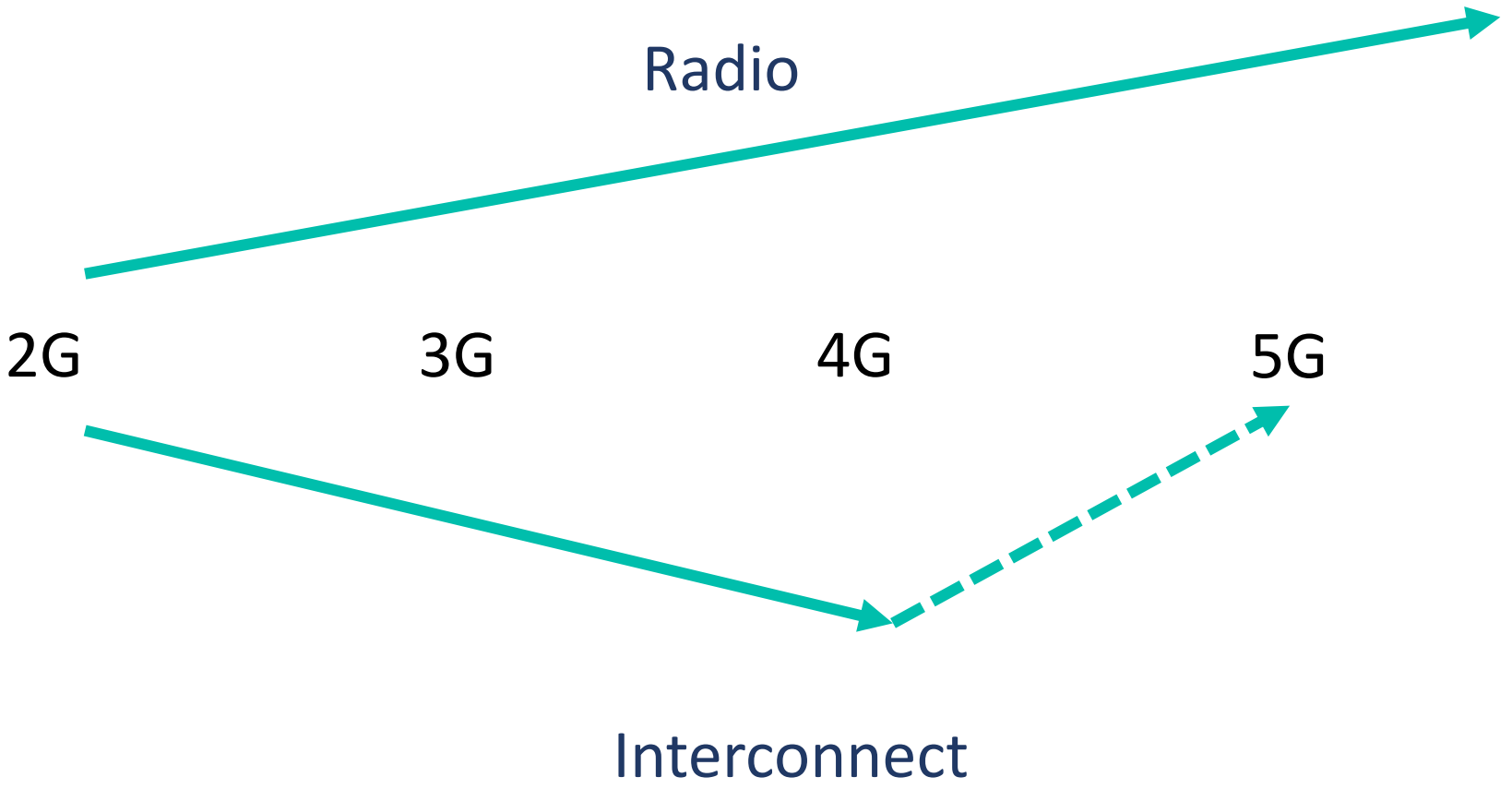


- 5G service based architecture and exposed web services
- Necessary for new business models
- Opens up new risks

Security trends



Protocol evolution

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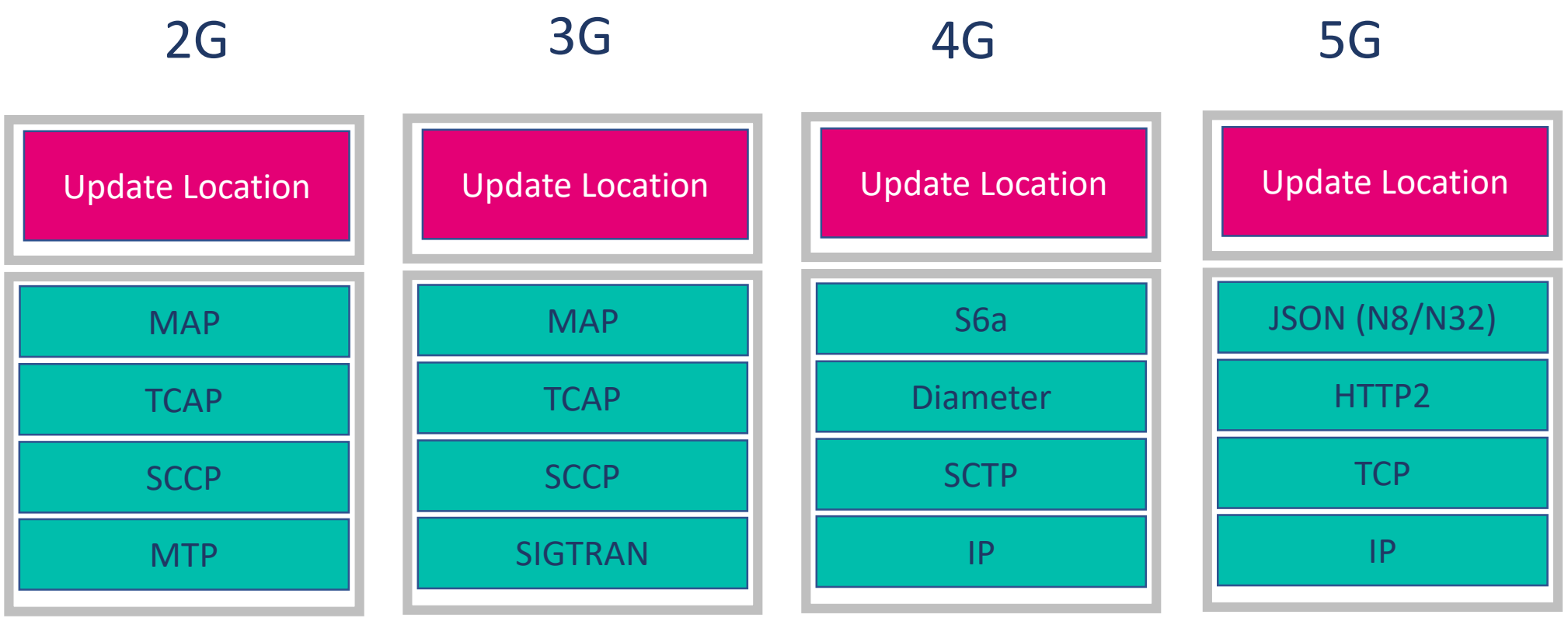
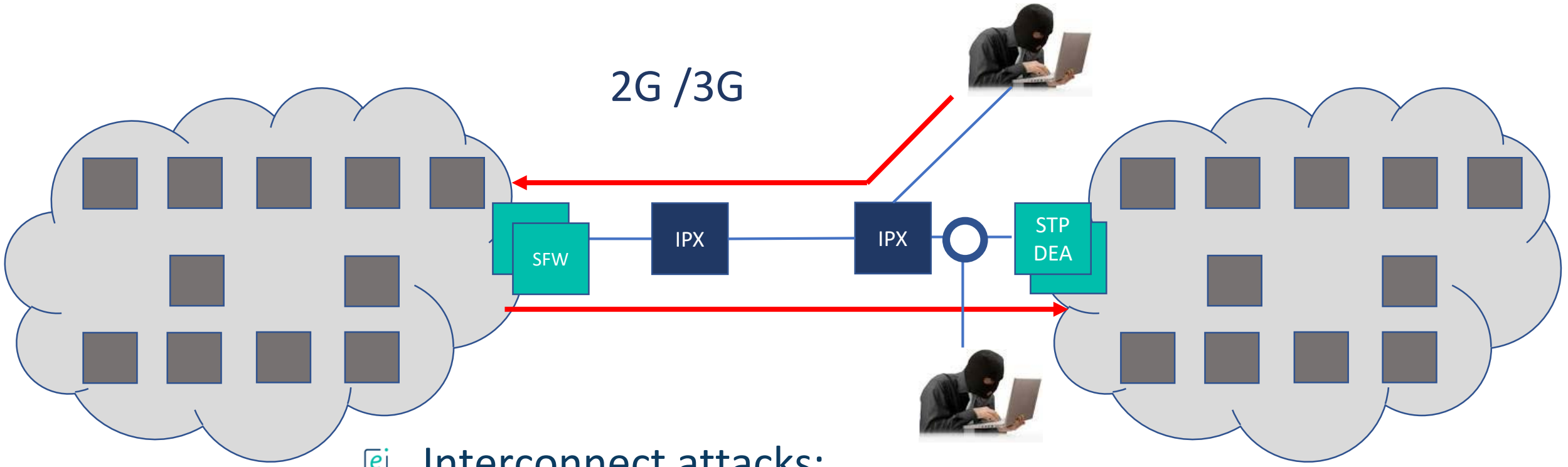


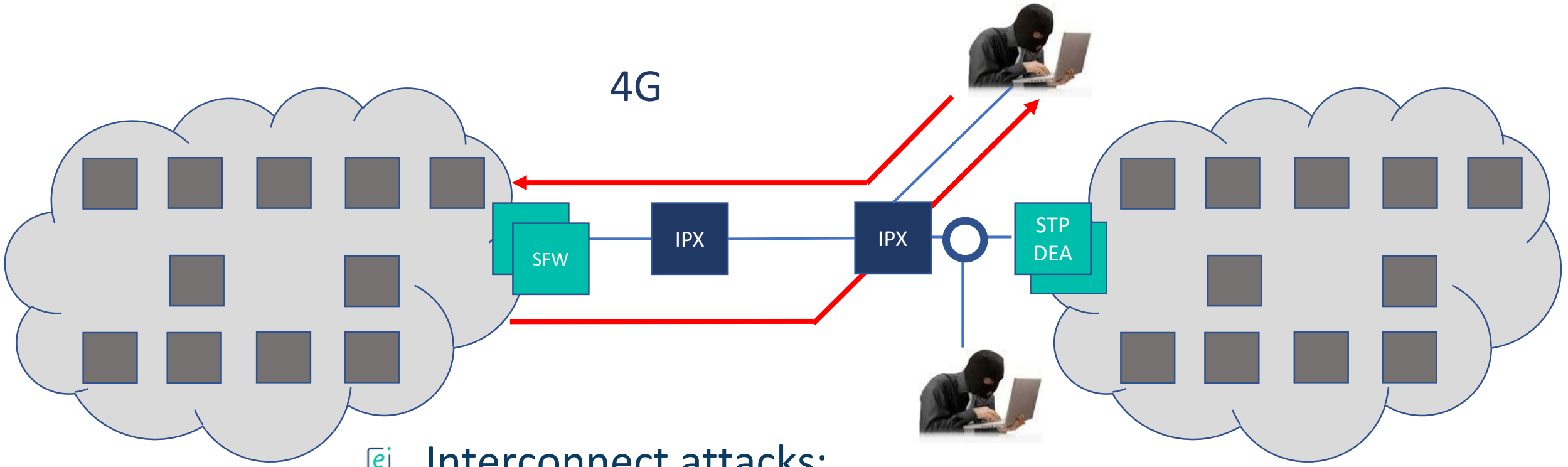
Parameters	Mostly fixed	Mostly fixed	Flexible AVPs	Free text
E2E security	Not used	Not used	Not used	Being defined
Session	TCAP dialogue	TCAP dialogue	Diameter Req/Resp (id)	Http Req/resp (id)
E2E routing	Global title	Global title	Host/realm route record	Host

Routing evolution and risks



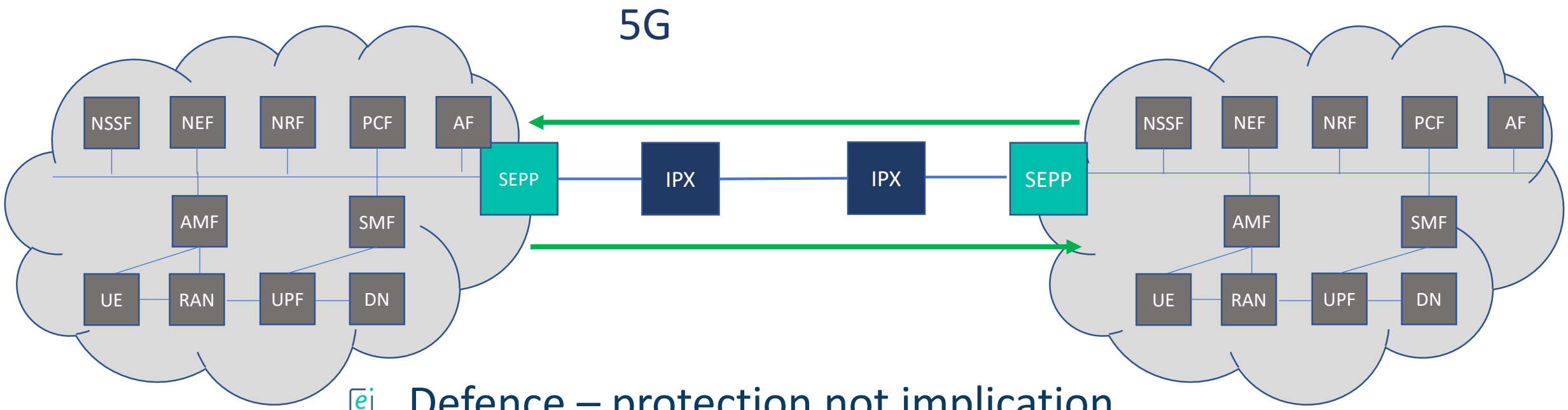
- Interconnect attacks:
  - Insert messages – intercept, track, deny service
    - E.g. Fake Location update, Fake reset
  - Snoop – monitor subscriber information
- Defence
  - Firewall – interprets what is valid message (e.g. consistency, location, velocity etc)

Routing evolution and risks



- Interconnect attacks:
  - Insert messages – intercept, track, deny service
    - E.g. Fake Location update, Fake reset
  - Snoop – monitor subscriber information
- Defence
  - Firewall – interprets what is valid message. Harder to spot spoof.

Routing evolution and risks



- Defence – protection not implication
  - End to End encryption and authentication
- IPX needs to inspect and modify messages
  - Provide commercial benefit particularly to smaller operators
  - Roaming hub – i.e. Merge small operator to “look” the same
  - Roaming services – e.g. VHE, Sponsored roaming

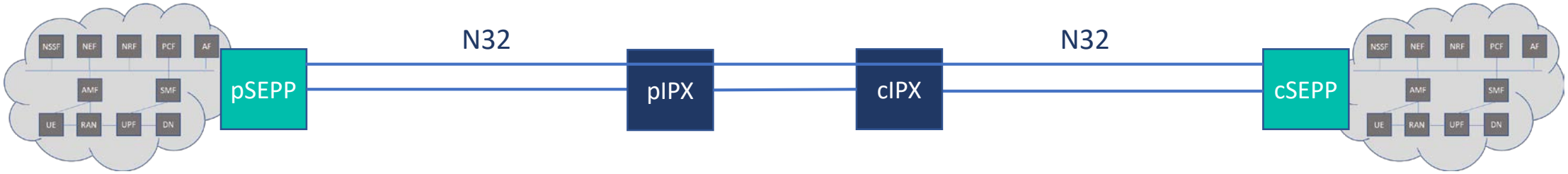
5G interconnect security requirements

- Encryption of sensitive parameters not needed by IPX
  - E.g. SUPI/IMSI, keys, (location)
- Protection against replay attacks
- Integrity of message
- Authentication of sender

For IPX (i.e. outsource routing, billing, services)

- Ability to modify parameters (as allowed by operators)
- Log of IPX making changes
- Integrity of message

5G interconnect security overview



- SEPP – Provides encryption, integrity and authentication

- SEPPs authenticated using TLS
  - Negotiate cipher suites for messages over interconnect (N32)
  - Exchange protection policies per NE and roaming partner – what can be modified
- SEPPs encrypt and sign all messages over N32 using JOSE (JSON web signing encryption)
  - Using JWE – JSON web encryption & signature (with symmetric key from TLS key exchange)
- IPX modify, append and sign changes
  - Using JWS JSON web signature (IPX private key from client PLMN)

5G interconnect security overview

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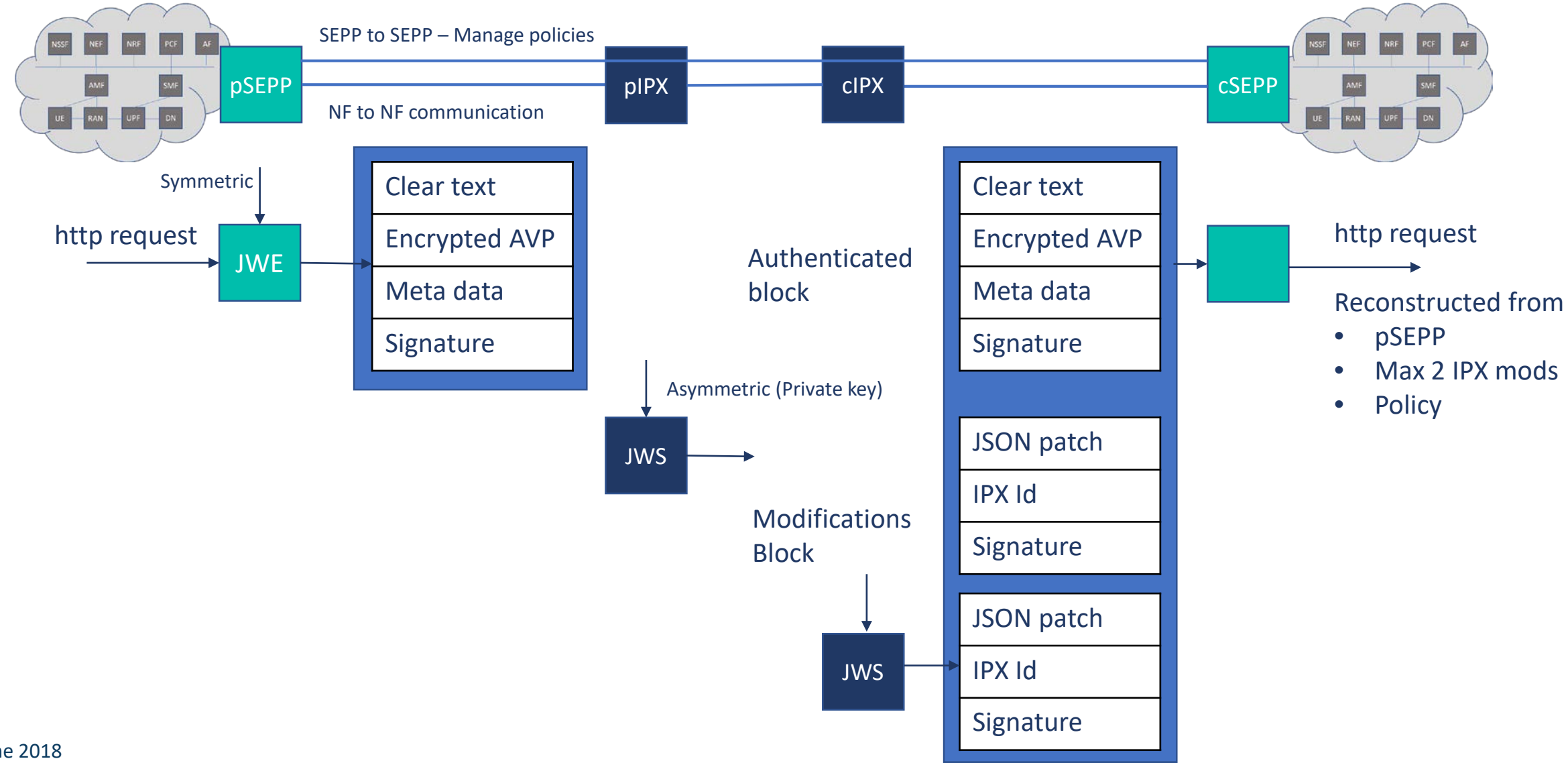

Summary

- SEPP secures 5G interconnect – encryption, integrity and authentication of signalling
- Improves security of interconnect versus 2G/3G and 4G even with firewall (but needs to be combined)
- Enables IPX business model, but allows operators to control what is modified