

# Diameter Interworking Case Study

## Overcoming Interworking Challenges Between LTE and pre-LTE Networks

### Enabling Connectivity with Diameter Interworking Function

As migration to LTE networks continues to gather momentum, many operators are confronted with the challenge of connecting new infrastructure to legacy systems and networks. The problem is that LTE infrastructure – and the IMS core, which is a requirement for the support of voice services in LTE networks – takes advantage of Diameter signalling for the management and delivery of key functions. In legacy networks, these functions were supported by SS7 signalling, specifically the Mobile Application Part, or MAP.

#### The Challenge

LTE networks must support connectivity to users from other networks and deliver services to legacy devices. While LTE penetration has grown dramatically, it is neither ubiquitous nor does it yet offer universal support for voice and other services. This means that systems that support Diameter will need to communicate with those that support SS7, and vice versa, in order to ensure consistent and seamless service delivery to all users.

LTE networks have been designed using similar principles to legacy networks. That is, they consist of a number of defined functional entities, which perform certain specific tasks, and a range of standardised interfaces between them. Thus, in an LTE network, the interface between any two functional entities will be known and defined in 3GPP documents. However, the specific information exchanged via this interface may differ, which means there may be a certain amount of variation in terms of content between any two implementations of a given interface. Any interworking between an LTE system and one from a legacy network must take account of both the differences in underlying signalling and the requirements of the information that must be conveyed.

#### The Solution

The solution is to take advantage of what is known as the Diameter Interworking Function, or IWF. This has been specified by 3GPP to address this problem and to provide a standardised means of converting between LTE and legacy SS7 domains. In particular, it specifies interworking between SS7 MAP and a range of Diameter interfaces that are required in Diameter networks for the support of analogous functionality to that delivered by MAP.

The IWF provides a means of mapping between legacy SS7 messages and the Diameter signalling required for the support of a number of common scenarios. For example, there may be a need to perform such interworking both within (intra) and between (inter) networks that are compliant to different standards.

Networks that support the Evolved Packet System (EPS) may also support equipment from earlier networks that depend on SS7 (pre Release 8) or may have to connect to networks that also use SS7 rather than Diameter. If a user from a legacy network connects across an LTE network, then interworking between the Diameter equipment and the earlier SS7 solutions will be required.

Similarly, in a roaming context, an LTE user may roam to a network that does not support LTE – and hence interworking with the legacy environment will be required. The interworking is essential as it enables subscriber data to be exchanged between the visited and home networks and for the user to access the services that they are authorised to use.

Another example, which involves the deployment of back-to-back IWF solutions involves a visitor to an LTE network from a network which supports LTE, 3G and 2G. In this case, the IWFs communicate via SS7 while using Diameter to connect to entities within either network. There are a number of such examples, several of which have been defined within the relevant specification, 3GPP TS 29.305.

Although the IWF is largely standardised, it must also support the ability to specify the contents of individual messages. This enables operators to account for any variation between implementations that use the otherwise standard interface and transport mechanisms.

However, the use of the IWF is likely to be much more widespread than is suggested by this document. Interworking between different generations of network equipment and different networks is essential in order to deliver services to subscribers. Although LTE penetration has increased dramatically, many 3G and 2G subscriptions will remain, which means that operators must continually

solve interworking challenges. Similarly, operators need to protect investments in legacy services and to ensure they maximise return. The IWF is a key first step in ensuring intra- and inter-networking functionality and addressing these problems.

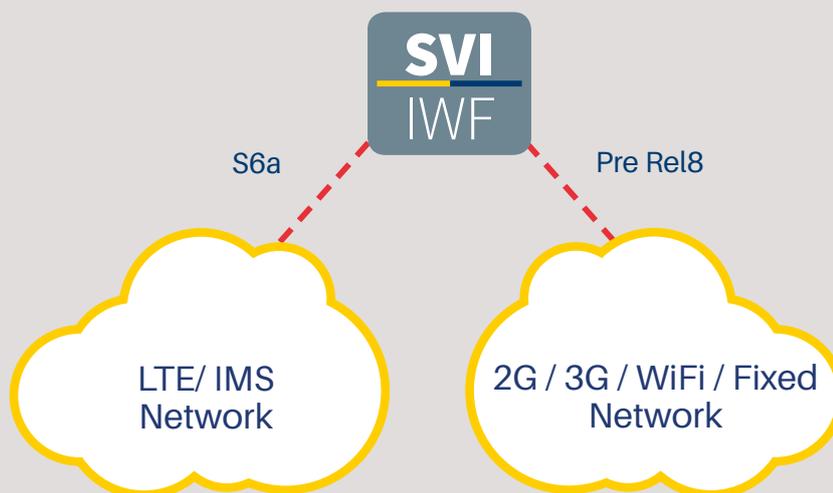
### How Squire Technologies Helps

The SVI\_IWF is a 3GPP compliant Diameter to SS7 IWF (interworking function) that enables legacy solutions to be extended to LTE and IMS networks. It is a complete package that can be deployed in stand-alone mode or as an optional module for Squire Technologies' range of existing SG, STP, SBC, MG, MGCF and other solutions.

The SVI\_IWF offers configurable control of Diameter interfaces, including S6a, S6d, S13, S13a and provides a critical link between 2G, 3G and Fixed infrastructure with LTE and IMS networks. It solves interoperability issues and enhances ROI, by protecting investments and enabling new service opportunities.

The SVI\_IWF provides a cost-effective solution that seamlessly interconnects legacy and LTE / IMS networks. For service providers, equipment vendors and systems integrators that need to connect from LTE to legacy, or legacy to LTE, the SVI\_IWF is a comprehensive, scalable solution that solves interworking challenges.

## Squire Technologies SWI\_IWF



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