stc

Reference Offer (RO)

Annex C Attachment 6

Mobile Network Technical

Information

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1   Mobile Network

1.1   The topology of stc's Mobile Network is very similar to that of stc's main core network in that it has the hierarchical structure shown in Figure 1 below. The network comprises of eight (8) Transit Mobile Switching Centres designated as Interconnection Gateways (MSC- ICG), two (2) in Riyadh, two (2) in Jeddah, two (2) in Makkah and two (2) in Dammam and 20 Mobile Switching Centres (MSC), once the 4G5 project is fully implemented. The cellular base stations are parented on base station controllers which provide the mobile connectivity within the individual cells.
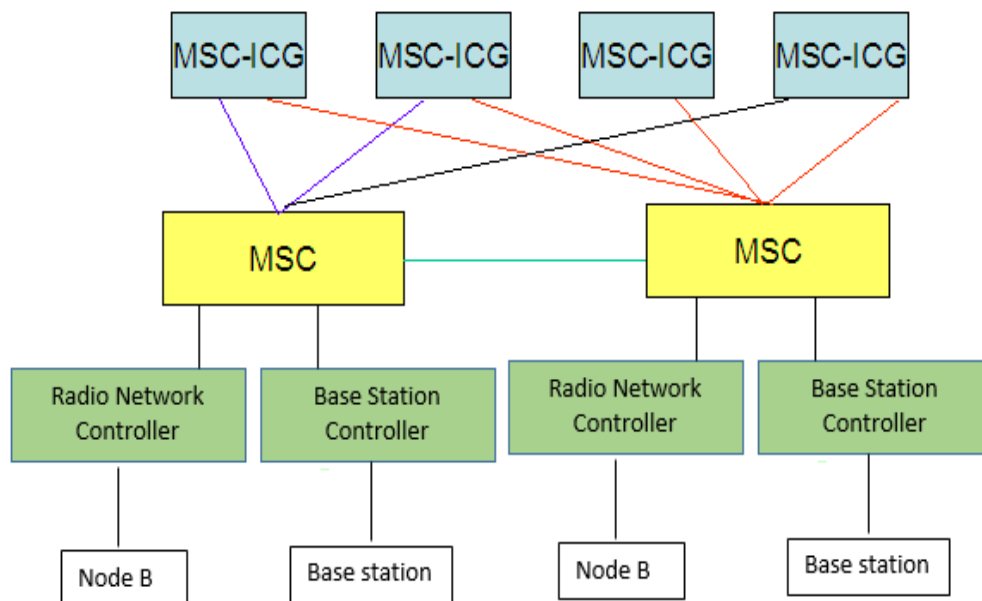
MSC-ICG : Mobile Switching Centre Interconnection Gateway

1.2 Mobile voice network description

1.2.1 stc mobile voice network consists of MSC-S and MGW used to provide service for stc customers and for national and international roamers:

- **stc** is using UDC architecture for its subscriber's databases.
- Mobile voice network is highly redundant and scalable to ensure excellent user experience.
- Mobile voice network is divided into five pools interconnected between them using TSC layer which consist of 8 T-MSC nodes.
- **stc** is providing VoLTE service for some of its LTE customers using IMS network as voice engine.
- The IMS platform is used for both fixed and mobile voice services.
- Mobile voice network support 2G, 3G and 4G access.
- It's planned to extend VoLTE services to the WiFi coverage.
- **stc** is planning to have 5G access.

1.3 Mobile packet network description

1.3.1 **stc** mobile packet network consist of 13 MME-SGSN, offering triple LTE/3G/2G access and 24 GGSN-SPGW gateways:

- stc's mobile packet core is used to provide MBB data service for stc customers and for national and international roamers.
- There is 3 SGSN/MME Pools to offer higher resiliency.
- All gateways work in load sharing, while local access is preferred.
- Mobile packet core network is highly redundant and scalable to ensure world-class user experience.
- stc is planning to have 5G access. Thus the packet core will evolve to support 5G access.

2   Traffic Interconnection to the Mobile Network

2.1   **stc** provides Interconnection to Other Licensed Operators to its Mobile Network at the MSC-ICG level. The Interconnection shall be provided at the POIs specified in Table 1 and in accordance with the technical standards/specifications as provided in this document i.e. Attachment 6 of Annex C (*Technical Information*).

3   Location of Points of Interconnection

3.1   The list of points of interconnections in the mobile network will be provided upon request to the requesting other licensed operators.

3.2   The list of MSC-ICGs mentioned in point 3.1 will be updated periodically. Additional POIs will be determined by agreement between **stc** and the Other Licensed Operator as part of the Network Plan and will be consistent with Clause 4.2 of Annex C (*Technical Information*).

3.3   In order for the Other Licensed Operator to interconnect with the **stc** mobile Network it shall:

a)   Establish Interconnection with **stc** at Points of Interconnection offered by **stc** at the MSC-ICG exchanges.

b)   For Interconnection with a Kingdom wide Other Licensed Operator public Network, the initial requirement is to establish Interconnection at a minimum of two (2) of the Points of Interconnection to ensure diversity and resilience. (The details of the initial Interconnection arrangement will be agreed during the initial network planning process.)

4   Interconnect Links and Routing

4.1   Interconnect Links will be used as necessary to provide Interconnection routes for the conveyance of the Other Licensed Operator's traffic into the **stc** Mobile Network. Routes will be established in accordance with the Other Licensed Operator's agreed Network Plan and capacity forecasts as stipulated in Annex E (*Forecasting*).

4.2 As the planned decommissioning of the **stc** Fixed Network Service Nodes continues in the future, in the case of new requests from the OLOs for Interconnection with the **stc** Fixed and Mobile Network, the OLOs will have to consider the PoI options that are available at that time based on the prevailing technology trends, whereas currently the **stc** POIs are based on Service nodes and Transit Switching Centres (TSCs).

4.3 Until routes are mature and traffic volumes become stable, interconnect routes will be uni-directional. At a later stage, bi-directional operation of these routes will be considered.

4.4 The Other Licensed Operator shall deliver only traffic which will terminate on the **stc** or hosted MVNO mobile number ranges at the Points of Interconnection at the MSC-ICG exchanges. Also, traffic to subscribers who have ported their numbers to **stc**, which will be preceded by the routing number prefix 1545, can be delivered to Points of Interconnection at the **stc** MSC-ICG exchanges.

4.5 The Other Licensed Operators shall be responsible for querying, routing and termination of the Calls to the numbers that have been ported out of the **stc** Network.

4.6 The Other Licensed Operator will be responsible for those routes on which it sends traffic to the **stc** Network and will dimension the routes to meet the target Unsuccessful Call Termination Ratio measures stated in Annex I (*Quality of Service Measures*).

5 Signalling Network

5.1   The **stc** mobile Network utilises Signalling System No.7 (SS7) and Diameter in accordance with ITU-T Q.7xx and ITU-T Q.7xx series standards with options as adapted to the Kingdom of Saudi Arabia, as described in Attachment 3 (*Saudi Arabia SS7 Signalling Standard*) of this Annex C (*Technical Information*), which provides the standard specifications for Layers 1, 2 and 3 of the Message Transfer Part (MTP). This Attachment 3 also provides the standard specifications for the ISDN User Part (SA-ISUP). The signalling point codes (SPCs) for the POI Service Nodes are mentioned in point 3.1 of this Attachment.
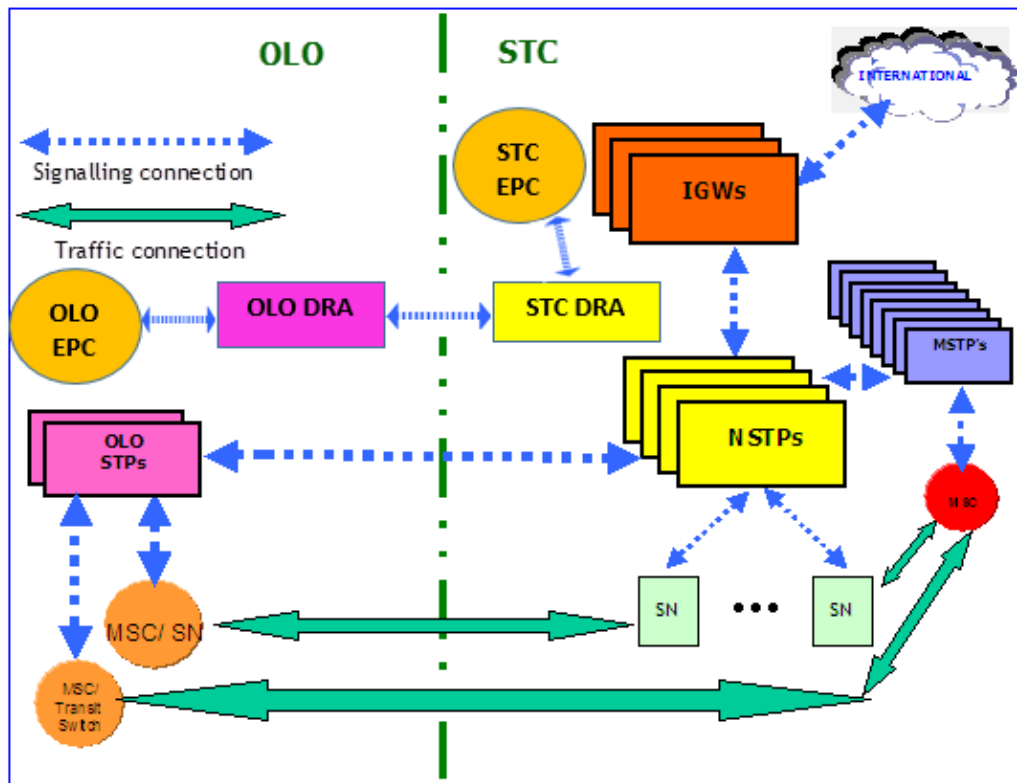

Figure 3 : Signalling Interconnection

5.2   The utilisation of SS7 links shall be maintained within the guidelines of ITU-T Q.706 Recommendations of 0.2 erlang under normal load and 0.4 erlang under high load (e.g. changeover of a parallel link). However, higher loads such as e.g. 0.3/0.6 normal/high may be permitted as appropriate.

5.3   As a part of the Network Plan, referred to in Annex H (*Operations and Maintenance Manual)*, a set of SS7 signalling tests will be performed in order to insure the compatibility and interoperability between **stc** and the Other Licensed Operator Networks at the 3 MTP levels as well as ISUP & Supplementary Services levels. These tests are extracted from the ITU-T Q.780, Q.781, Q.782, Q.784 and Q.785 Recommendations.

5.4   Figure 3 above, shows an architectural schematic diagram of the **stc** signalling network, which supports the **stc** Network. In addition, the necessary connections of the Other Licensed Operator signal transfer points (OLO STPs) and International Gateways (IGWs) to the **stc** national STPs (NSTPs) are shown. The SPCs for the NSTP's are 1000, 1001, 2000, 2001. In addition, the list of M-STPs and their locations along with their SPCs will be provided as mentioned in point 5.5 which will be updated periodically depending on the nodes modernization requirements.

5.5   The list of of STGs, their Locations and Signalling Point Codes will be provided upon request to the requesting other licensed operators.

6 Synchronisation

6.1 The **stc** Network synchronisation is generally in line with relevant ITU-T recommendations. In order to establish Interconnection, the Other Licensed Operator will fulfil the timing performance requirements of ITU-T recommendation G.811. This can be achieved for Plesiochronous Mode by deriving reference timing from OLO's own Stratum 1 clock or the OLO will receive the master timing signal from **stc**.

6.2 The specification of the timing system that is required in order to ensure proper operation of the interconnected Networks is given in Annex C, Attachment 5 (*stc Synchronisation Scheme*).

6.3 Licensed operators are responsible for the management of synchronisation on their respective networks.

7 Interfaces

stc is providing the standard interfaces on the market for interconnection such as : E1, STM-1,STM-4 ,STM16,STM-64, IG,10G and 100G.

8 Numbering

8.1 Number Ranges

8.1.1 Only traffic to mobile number ranges allocated to **stc** and those allocated to **stc** hosted MVNOs can be delivered to Points of Interconnection at the **stc** MSC-ICG exchanges with the exclusion of the ranges reserved for other purposes including Global Title (GT) and (Mobile Roaming Station Number) MRSN. Also, traffic to subscribers who have ported numbers to **stc**, which will be preceded by the routing number prefix 1545 can be delivered to Points of Interconnection at the **stc** MSC-ICG exchanges. For the avoidance of doubt, such routes cannot be used for the delivery of traffic to **stc** geographic national number ranges, **stc** non-geographic number ranges, international number ranges or any other number ranges even as an overflow route. **stc** will not onward route any calls to such number ranges, which are delivered, to the POI on the MSC-ICG.