STIN 517

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Suppliers' Trial Information Note

For The BT Network

Single Order Generic Ethernet Access (SOGEA) over VDSL2 and G.fast

Service & Interface Description

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1. Service Outline

1.1 General

The information contained in this STIN relates to the trial of a new product and change to engineering policy and practice. The publication of this STIN does not commit Openreach to a commercial launch of any new/changed service, nor does it commit Openreach to the particular implementation described within this document. Should Openreach decide to commence a roll-out of the trialled engineering implementation, the matters pertaining to this STIN will be reflected in an update to the relevant Suppliers Information Notes (SINs) and the publication of the necessary Service Provider Information Notes (SPINs).

It should be noted that the information contained within this STIN might be subject to change due to either the results of testing, or due to feedback from trial participants. Please check with the http://www.btplc.com/sinet/ site to ensure you have the latest version of this document.
Further information regarding the trial and pilot network test and Proof of Concept facilities can be obtained by contacting your Openreach Sales and Relationship Manager.
Single Order GEA (SOGEA) is a data-only NGA fibre to the cabinet product that will be self-contained, hide complexity by including the copper bearer, and could be conveniently purchased through a single order.

SOGEA:

- is an addition to the Openreach product portfolio;
- uses the same Ethernet characteristics as currently available from GEA-FTTC products;
- is supplied with its own copper bearer that would terminate in the DSLAM/exchange and not with MPF or WLR equipment;
- is available as a new provide or migration from/to existing products or product combinations;
- will accommodate the industry geographic number port process in the order and provision process;
- requires any voice service to be provided entirely by a service provider (e.g. a VoIP service)
- will be delivered using VDSL or G.fast technology

SOGEA is generally expected to be a self-install (PCP-only) provision with CPE Enablement (i.e. CP provided modem/router with either an optional internal or an external ATA). If voice reinjection is required, then an NTE5C with a SOGEA isolation faceplate must be fitted. The service will not be supported if an Openreach modem is connected in the customer premise. Appointed install options will also be available, including installation of NTE5C and faceplate where required, but will require a CP modem-router.

This STIN refers extensively to Openreach SIN498 (GEA-FTTC Service and Interface Specification) [1] and STIN520 (GEA-NGA2 G.fast Pilot, Service and Interface Description) [4].

1.2 Service Availability

1.2.1 SOGEA over VDSL2 Locations:

Technical Trial-

- Swansea, Ipswich, Brentwood (TBC), Thurso, Newcastle, Leeds

CP Trial 1-

- London
- North West (Manchester, Merseyside)
- Midlands (Birmingham)
- Yorkshire (Leeds, York)
- Scotland (Glasgow, Edinburgh)

CP Trial 2 & 3-

- Limited exchanges, on application, in:
    - Technical Trial areas
    - CP Trial 1 areas
    - Colchester & Ipswich
    - Northumberland and Wearside
    - Romford
    - Southern London

Pilot Locations-

- North East General Manager's Area
- East Anglia General Manager's Area
- South East General Manager's Area

1.2.2 SOGEA over G.fast Locations:

Technical Trial-

- Cherry Hinton and Gillingham

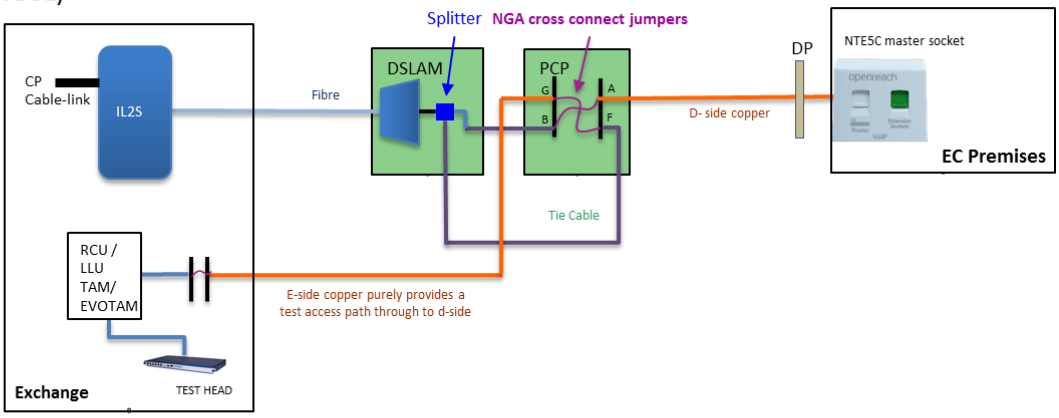
Pilot Locations-

- Will be opened up to the FTTC (G.fast) footprint in the North East, East Anglia and South East areas in early 2018.

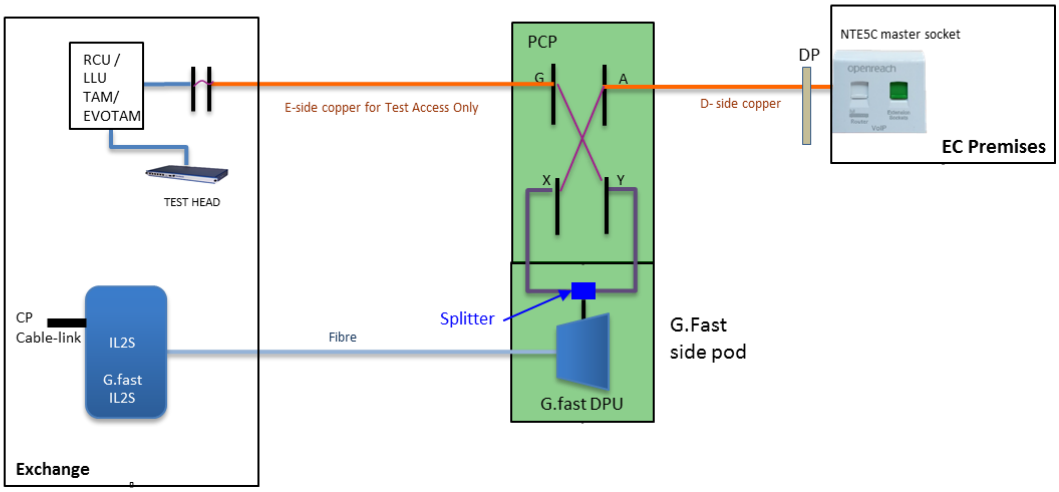
1.3 SOGEA Network Architecture

The following diagrams show a typical Openreach deployment of SOGEA up to the NTE, whilst under pilot/launch. This relies on exchange based copper test access.

- DAY1 SOGEA (VDSL)



- DAY1 SOGEA (G.fast)



Please note the type of NTE and faceplate may vary (explained later). Working service will also require a CP's own modem-router, not shown here.

1.4 The copper pair associated to a SOGEA service

The copper D-side pair forms part of the working circuit that runs the SOGEA service.

Under the SOGEA test regime the copper E-side will provide the connectivity back to the exchange for copper test access where needed. Openreach will test the whole circuit from the test head in the exchange to the NTE.

The SOGEA copper pair will have the same specification as detailed in SIN-349 Section 3 entitled 'MPF Specification'.

SIN-349 Section 5 entitled 'MPF Section 5 MPF Path Facility Operation' also applies to SOGEA

1.5 Conditions on the line from the copper exchange

With the exception of a temporary parallel running period, there will be no **dial tone** from the exchange on SOGEA lines. The temporary parallel running period can apply to migrations from WLR3-PSTN/LLU-MPF to SOGEA

Any other conditions from the exchange will depend upon the test access solution, tabled as follows:

The approximate 20% SOGEA lines with RCU test access, will be presented with Number Unobtainable (NU) tone (400Hz) and voltage but no dial tone.

The other approximate 80% SOGEA lines with LLU-TAM or EVO-TAM test access will have no conditions from the exchange. This means no dial tone, no NU tone and no voltage.

These percentage and estimates and the actual volumes will be subject to the SOGEA order types place by CPs.

Where the SOGEA Exchange copper test access is via:	Dial Tone on the line?	Number Unobtainable (NU) Tone (400Hz)	Exchange Voltage	Typical scenarios
RCU - AXE10	No - with the exception of parallel running	Yes	Yes	May apply on SOGEA lines that have migrated from: • WLR3 PSTN only • WLR3 PSTN + LLU SMPF • WLR3 PSTN + FTTC
RCU - System X	As above	Yes	Yes	As above
EVO-TAM	As above	No	No	May apply on SOGEA lines that have migrated from: • WLR3 PSTN + LLU SMPF • WLR3 PSTN + FTTC
LLU-TAM	As above On migrations from MPF, Openreach do not expect dial tone to persist from the losing CP equipment	No	No On migrations from MPF, Openreach do not expect any voltage to persist from the losing CP equipment	May apply on SOGEA lines that have migrated from: • MPF Only • MPF + FTTC

1.6 The GEA Service Test and raising a touble report

The GEA Service Test sources multiple parameters and assesses them in real time to determine if there is an anomaly on the service.

The key symptoms of a trouble report, as experienced by end-customers, are slow speed and modem retrains. However, identical symptoms can also appear intermittently when there is

Internet congestion or if the Internet applications require more stability than the current DLM policy provides.

Hence many reports of speed or line stability issues are not actually faults but temporary issues which naturally occur on a contended DSL network.

The GEA service test is designed to accept speed and stability faults for additional Openreach diagnostics and investigation on the following basis:

- If the number of failed line retrains in a given period exceeds a threshold;
- If the number of errored seconds in a given period exceeds the DLM Policy threshold;
- If the Service Test algorithms identifies a problem that's likely to be capable of resolution within the Openreach domain, then it will provide an overall 'fail' result, to allow a GEA1 fault to be accepted in. If it can't see any fault conditions, it may be that DLM has managed the line speed down but this is not a fault.

Please note current speed, speed relative to previous speeds, and speed relative to eMLC estimates can be impacted by many conditions and is not a reliable guide that the symptoms are likely to be capable of resolution within the Openreach domain.

1.7 Test OK

Where the GEA Service Test indicates a potential problem with the line, as in the situations described above, the CP can raise a GEA1 fault.

However, in the event that the GEA Service Test returns a PASS result (MFL = OK), but you would still like us to investigate a particular issue on the line; you may raise a GEA3 Visit Assure trouble report. A Visit Assure enables you to appoint an engineer visit to the End customer premises to perform further diagnostic activities on the line.

1.8 Recommendations for IP or ATA voice services

SOGEA is a broadband only data product from Openreach. For CPs who choose to host over-IP or ATA based over-the-top voice services, Openreach recommends:

- A choice of 'Stable' DLM policy which has the lowest tolerance to errors and retrains;
- avoiding CPE self re-boots on a regular basis;
- a low tolerance to errors when selecting CPE codec.

2. SOGEA over VDSL2 Interface Descriptions

This section defines the interface descriptions for SOGEA over VDSL2.

2.1 GEA Cablelink

2.1.1 Physical connection

Requirements as defined in SIN498.

2.1.2 Ethernet Frame Size

Requirements as defined in SIN498.

2.1.3 VLAN Tagging Options at the GEA Cablelink for SOGEA

2.1.3.1 Openreach Added Tags

Requirements as defined in SIN498.

2.1.3.2 CP Added Tags

Requirements as defined in SIN498.

2.1.4 Ethertype

Requirements as defined in SIN498.

2.1.5 Downstream Priority Marking

As SIN498 but with the following additional strong recommendation:

The CP should mark downstream voice traffic with PCP code marking 4. This will ensure that, at the VDSL2 port on the street DSLAM, the downstream voice frames are given strict priority over multi-cast packets and other Internet data sent with priority markings of 0 to 3. CPs are also advised to consider that voice frames marked at priority 4 will be treated at the VDSL2 port identically to other Internet data sent as priority 4, and the relative rates may have a bearing on the quality of voice services delivered.

2.1.5.1 Per EU / Intra EU frame drop prioritisation

As SIN498 but with the following additional strong recommendation:

In order to ensure that voice frames receive prioritised rate marking, CPs should ensure that frames with PCP code markings of 1 to 4 do not exceed the VDSL2 line rate or the prioritised rate, whichever is lower.

2.1.6 Downstream Shaping

Requirements as defined in SIN498.

2.1.7 Intermediate Agent / DHCP Relay Agent

Requirements as defined in SIN498.

2.1.7.1 Inverted DHCP/PPPoE

Requirements as defined in SIN498.

2.1.8 Ethernet OAM

Requirements as defined in SIN498.

2.1.9 Transparency

Requirements as defined in SIN498.

2.1.10 Frame Duplication

Requirements as defined in SIN498.

2.2 User Network Interface – General

2.2.1 VDSL2 Rates

Requirements as defined in SIN498

2.2.2 Dynamic Line Management

Requirements as defined in SIN498.

2.2.3 Upstream Shaping

Requirements as defined in SIN498.

2.2.4 Upstream Priority Marking

The following requirement supersedes the corresponding section in SIN498:

The SOGEA service will NOT be supported over an Openreach provided modem. Furthermore, the GEA service does not recognise PCP priority code markings upstream. Therefore the CP should ensure that their CPE gives strict priority to upstream voice frames.

Any VLAN tags added to upstream packets shall be treated as payload by the SOGEA service.

2.2.5 Modem UNI Port Loopback Testing

Requirements as defined in SIN498.

2.3 Openreach Provided Modem Product Variant

Not Applicable to SOGEA.

2.4 CP Provided Modem Product Variant

Requirements as defined in SIN498.

Note that support of analogue telephony devices over SOGEA will require a CPs' ATA to be provided with the modem/router, so that analogue telephony devices can be plugged directly into the ATA. In cases where additional devices on home extension wiring need to be fed by the ATA, a special cable is needed to connect the ATA to the voice re-injection socket on the NTE5 SOGEA faceplate (see section 4.4.1). This SOGEA faceplate isolates the voice reinjection voltage from the Openreach network and is required to give reliable service from the ATA on analogue devices.

If the customer does not intend to use their extension wiring, then there is no requirement for voice reinjection and hence no need for an isolation faceplate

It is a breach of T&Cs for non-isolated voice reinjection to be applied to the Openreach network. This is can cause damage to the Openreach network and puts the service at risk.

2.4.1 Physical Network Termination

Openreach provide a metallic line with a line-box known as a Network Terminating Equipment (NTE). The physical interface is a standard telephone socket on the line box as described in SIN-351 [2] or an RJ45 socket or both, depending on the type of front plate installed.

2.4.1.1 Examples of compatible faceplates:

NTE5C with standard CCU front plate

(There is also an NTE5A version of this)

NTE5A with interstitial SSFP (Service Specific Front Plate)

NTE5C with SSFP

SOGEA VRI Isolation Front plate

SOGEA VRI Isolation Front plate switched version

The RJ45 socket will present the DSL signal on pins 4 and 5. Looking into the socket from the front – with the key at the bottom – Pin 1 is on the left and Pin 8 is on the right.

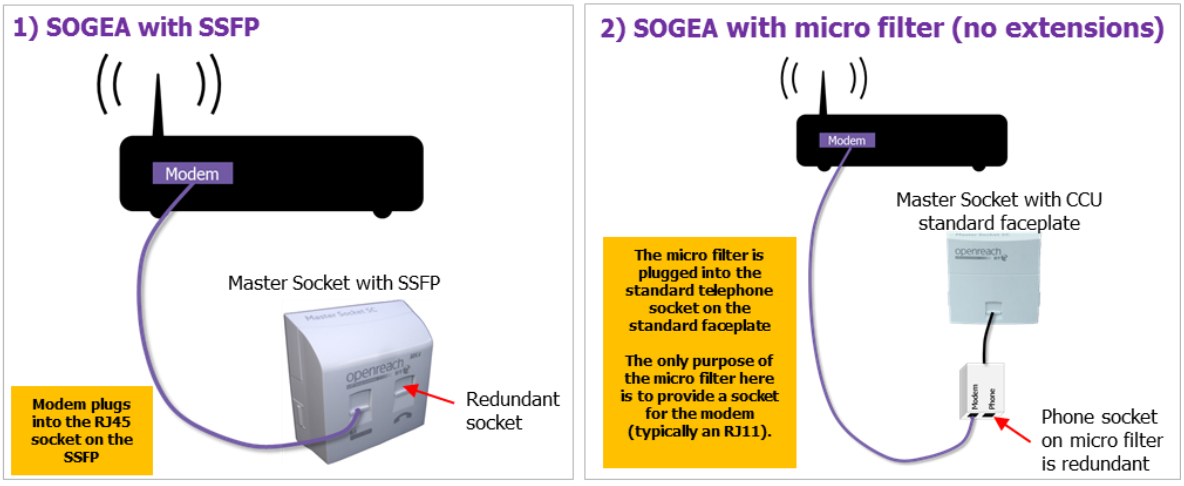
The following table explains what the type of signals that the front plate blocks or passes through. It also shows the how the Service Test Dialogue Service and Line Test Dialogue Service will report the faceplate, if its signature is detected. Note that the SOGEA isolation faceplates are the only faceplates that come with a signature for detection.

Faceplate	Switch position	At the NTE socket	enables on an extension(s):	prohibits on an extension(s):	prohibits on the Openreach Network:	Faceplate value	Action for WLR3-PSTN / LLU-MPF
SOGEA 1b "VoiP" 	n/a	Enables broadband but blocks narrowband from the exchange	enables extensions for an ATA derived VRI service	Blocks narrowband from the exchange (e.g. WLR3-PSTN / LLU-MPF) and broadband from reaching extensions (e.g. ADSL, VDSL, G.fast)	Blocks VRI from coming back onto the Openreach external network, if correct cable is used	**Detected SOGEA Physical Isolator**	To change this faceplate to a Standard CCU or an SSFP based on the customer's product
SOGEA 2b "VoiP-S" 	Up	Enables broadband and narrowband from the exchange	enables extensions for exchange narrowband services (e.g. WLR)	Blocks broadband from reaching extensions (e.g. ADSL, VDSL, G.fast). Blocks VRI reaching extensions	Blocks VRI from coming back onto the Openreach external network, if correct cable is used	**Detected Other**	N/A
	Down VoIP	Enables broadband but blocks narrowband from the exchange	enables extensions for an ATA derived VRI service	Blocks any broadband services from reaching extensions (e.g. ADSL, VDSL, G.fast) Blocks any exchange narrowband service (e.g. WLR).	Blocks VRI from coming back onto the Openreach external network, if correct cable is used	**Detected SOGEA Physical Isolator**	To move the switch to the other position (To position 1)
Standard CCU 	n/a	Enables everything & blocks nothing	Anything	Nothing (allows all services through)	Nothing (allows all services through)	**Not Detected** *(can't detect this faceplate)*	N/A
VDSL/ADSL /SDSL (SSFP) 	n/a	Enables broadband on one socket & narrowband on other	enables extensions for exchange narrowband service s (e.g. WLR)	Blocks any broadband service from reaching extensions (avoids Bridge Taps but the Hub must be plugged into master socket)	Nothing (allows all services through but broadband must be from the modem socket only and narrowband from the phone socket or extensions)	**Not Detected** *(can't detect this faceplate)*	N/A

2.4.1.2 Typical deployment scenarios without the use of extensions:

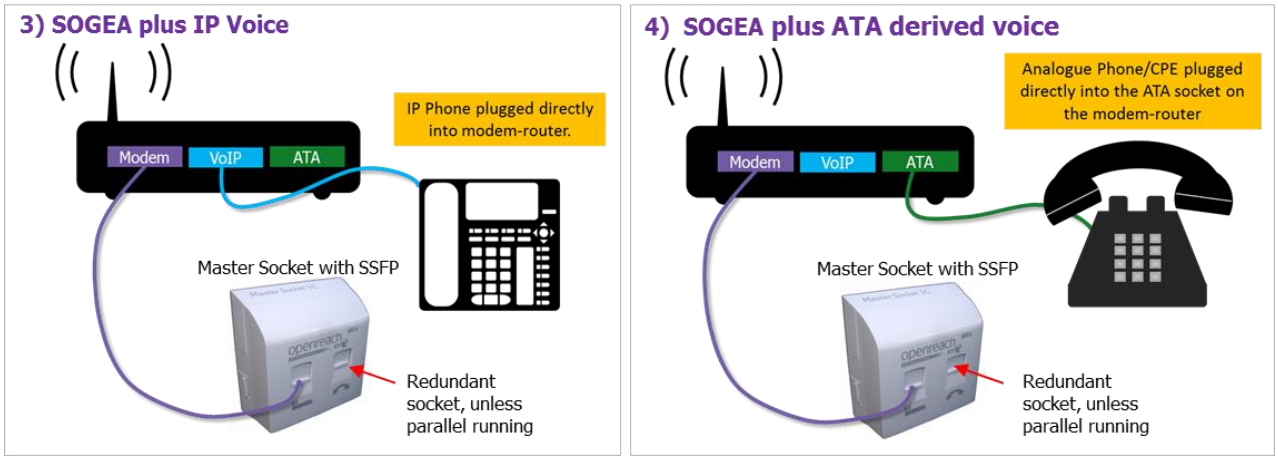
2.4.1.2.1 SOGEA without IP or ATA (Analogue Telephone Adapter) voice:

Here are two deployment examples, where the customer is using SOGEA without an IP or ATA voice service over the top of the SOGEA broadband service.



2.4.1.2.2 SOGEA with IP/ATA voice 'over the top' VoIP

Here are two more deployment examples (*again without the use of extensions*), where the CP has chosen to host over IP or ATA voice service 'over the top' of the SOGEA broadband service.



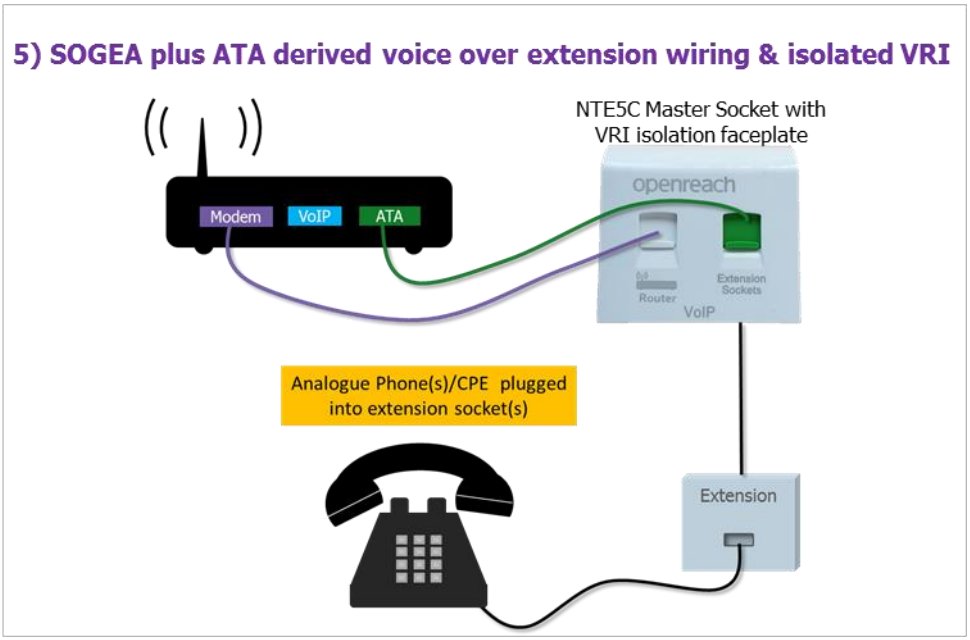
2.4.1.3 Typical deployment scenarios with the use of extensions (Voice Re-Injection):

Where the CP has identified that voice reinjection around a customer's existing home wiring is required, the customer's NTE must be fitted with a SOGEA voice reinjection isolation faceplate to avoid harm to the Openreach network and Customer Experience issues. A SOGEA VRI isolation faceplate can only be fitted to the new style NTE5C Master Socket back plate.

SOGEA provisions will be available as either a managed install or customer self-install order type. Customer premises that do not have a NTE5C will need their existing NTE to be replaced with a NTE5C. This can only be done by an Openreach engineer or a qualified CP engineer (subject to commercial agreement between Openreach and the CP).

Where the NTE5C is pre-installed there is no imposed restriction on who can change the faceplate, this can be done using the clip on/off design without the aid of a screwdriver, for those willing and able.

There are two types of SOGEA VRI isolation faceplates, a standard and a switched version. Each faceplate will work with SOGEA (VDSL2) or SOGfast (G.fast), they're universal. Both variants connect identically.



The SOGEA VRI isolation faceplates function as follows:

- Standard 'VoIP' Non-switched version:
  - Isolates home wiring from both broadband and exchange voice and requires a modem directly wired to the NTE5C faceplate
  - CP provided ATA cable is plugged into the green socket labelled 'Extension Sockets'
- Switched 'VoIP-S' Version only
  - Requires a modem directly wired to the NTE5C faceplate
  - Switch 'up' allows extensions to be used with exchange based analogue telephony and protects the broadband signal from the extension wiring
  - Switch 'down' **VoIP** it operates identically to the standard, non-switched version (isolates broadband and exchange voice) and supports voice reinjection via the green socket

On both SOGEA VRI isolation faceplates the sockets are as follows:

'Router' socket accepts RJ45 or RJ11 plugs and is identical to standard Service Specific Front Plates (SSFP) with the DSL active pair on RJ45 pins 4 and 5. The modem must be plugged in here. Alternatively on the rear of the front plate is a tool-less connector that can be used as a data extension if that is preferred. On the switched version this socket is unaffected by the switch position

'Extension Sockets' only supports VRI (never exchange based analogue voice). The socket is a Modified Modular Jack (6 pins with an offset retaining clip) with pins 2 & 5 supporting VRI and connect via bell-wire ringing regeneration to the 3-wire home extensions. On the switched version when the switch is up this socket becomes inactive but the extension sockets are enabled for exchange based analogue voice. When the switch is down is performs identically to the non-switched type.

The plug on the cable shown in green in Figure 1 (connecting the 'Extension Sockets' with the ATA) will need to meet the following requirements:

- Modified Modular Jack (DEC style) which is similar to an RJ11 but the retaining clip if off-set to one side
- There is no published standard to reference but the Openreach vendor will produce the socket on the faceplate to be compatible with at least the following MMJ plug suppliers:
  - Stewart Connector – Bel Group 940-SP-30666R-OST
  - L-com 6x6 MMJ part TSP3066-MMJ

With either plate fitted there is no requirement for traditional micro-filters to be used on extensions

Pre-existing type of NTE & Faceplate (before SOGEA Provision)	Any home wiring extensions?	Is VRI needed	Minimum to achieve best performance for SOGEA	Ideal
NTE5A/C with standard CCU faceplate and micro filter	no	no	No change	NTE5C with SSFP
	yes	no	Upgrade to NTE5C with SSFP	← use this
	yes	yes	Upgrade to NTE5C with SO-VRI front plate	← use this
NTE5A with SSFP	no	no	No change	NTE5C with SSFP
	yes	no	No change	NTE5C with SSFP
	yes	yes	Upgrade to NTE5C with SO-VRI front plate	← use this

2.4.2 Street Access Physical Realisation

Not Applicable to SOGEA.

3. CPE Requirements for SOGEA over VDSL2

Requirements as defined in SIN498.

3.1 Scope

Requirements as defined in SIN498.

3.2 Requirements

Requirements as defined in SIN498.

3.2.1 Physical Connection

Requirements for VDSL2 modem as defined in SIN498. The ATA will require a BT plug to enable it to be connected to the POTS port on the faceplate.

3.2.2 VDSL2 Physical Layer

Requirements as defined in SIN498.

3.2.3 Ethernet Layer

Requirements as defined in SIN498.

3.2.4 WAN VLAN Layer

Requirements as defined in SIN498.

3.2.5 Ethernet OAM

Requirements as defined in SIN498.

3.2.6 CPE VDSL2 Filter Requirements

3.2.6.1 Centralised CPE VDSL2 filter device requirements

Not applicable to SOGEA

3.2.6.2 Distributed CPE VDSL2 Filter Requirements

Requirements as defined in SIN498.

3.2.6.3 Additional Notes About CPE Filters

Requirements as defined in SIN498.

3.2.7 Supplementary Information

Requirements as defined in SIN498.

3.2.8 Analogue Telephony Adaptor

If the CP's equipment contains an ATA and there is any intention or likelihood to connect the ATA to the home wiring to drive additional telephony devices, a SOGEA front-plate must be fitted as defined in section 2.4.1. This is in order to prevent unexpected and potentially harmful voltages from being passed from the ATA/home wiring to the Openreach network. Openreach is concerned that floating voltages or voltages positive with respect to earth may have a harmful effect on its network.

If the ATA/home wiring is not isolated by use of one of the SOGEA face-plates, problems may occur that prevent the ATA from functioning correctly e.g. off/on–hook detection.

Openreach may deploy test mechanisms to detect and report the use of non-isolated ATA equipment – refer to the SOGEA trial contract for further information.

3.2.9 SOGEA/SOGfast Faceplate

SOGEA/SOGfast front-plates may contain passive electrical signatures that will allow Openreach to determine which type of face-plate is attached to the circuit. These circuits do not change the electrical properties of the line as defined in SIN349 [3].

As part of the SOGEA trial Openreach may conduct experiments into the long term effects of the presence and absence of wetting current on SOGEA circuits – SOGEA/SOGfast faceplates may contain a wetting current sink, that is triggered by an A-B voltage above the normal PSTN line voltage. Voltages from the ATA/home wiring will not trigger the wetting current sink, as the home wiring side is DC isolated.

CPs should note that the SOGEA non-switched face-plate must be removed and replaced with an appropriate alternative if the service is changed to include standard WLR or MPF With the SOGEA switched faceplate the is the option to switch into the mode suitable for exchange based voice, and note the telephone will need to be plugged into an extension socket.

NOTE: The NTE5C back plate contains the standard termination/ringing components across the A/B pair of a 470k Ohm resistor in series with a 1.8uF capacitor, with the bellwire ringing signal being generated at the union between the resistor and capacitor.

4. SOGEA over G.fast Interface Descriptions

This section defines the interface descriptions for SOGEA over G.fast.

4.1 GEA Cablelink

4.1.1 Physical connection

Requirements as defined in STIN520.

4.1.2 Ethernet Frame Size

Requirements as defined in STIN520.

4.1.3 VLAN Tagging Options at the GEA Cablelink for SOGEA over G.fast

4.1.3.1 Openreach Added Tags

Requirements as defined in STIN520.

4.1.3.2 CP Added Tags

Requirements as defined in STIN520.

4.1.4 Ethertype

Requirements as defined in STIN520.

4.1.5 Downstream Priority Marking

As STIN520 but with the following additional strong recommendation:

The CP should mark downstream voice traffic with PCP code marking 4. This will ensure that, at the G.fast port on the street DSLAM, the downstream voice frames are given strict priority over multi-cast packets and other Internet data sent with priority markings of 0 to 3. CPs are also advised to consider that voice frames marked at priority 4 will be treated at the G.fast port identically to other Internet data sent as priority 4, and the relative rates may have a bearing on the quality of voice services delivered.

4.1.5.1 Per EU / Intra EU frame drop prioritisation

As STIN520 but with the following additional strong recommendation:

In order to ensure that voice frames receive prioritised rate marking, CPs should ensure that frames with PCP code markings of 1 to 4 do not exceed the G.fast line rate or the prioritised rate, whichever is lower.

4.1.6 Downstream Shaping

Requirements as defined in STIN520.

4.1.7 Intermediate Agent / DHCP Relay Agent

Requirements as defined in STIN520.

4.1.7.1 Inverted DHCP/PPPoE

Requirements as defined in STIN520.

4.1.8 Ethernet OAM

Requirements as defined in STIN520.

4.1.9 Transparency

Requirements as defined in STIN520.

4.1.10 Frame Duplication

Requirements as defined in STIN520.

4.2 User Network Interface – General

4.2.1 G.fast Rates

Requirements as defined in STIN520

4.2.2 Dynamic Line Management

Requirements as defined in STIN520.

4.2.3 Upstream Shaping

Requirements as defined in STIN520.

4.2.4 Upstream Priority Marking

The following requirement supersedes the corresponding section in STIN520:

The SOGfast service will NOT be supported over an Openreach provided modem. Furthermore, the GEA service does not recognise PCP priority code markings upstream. Therefore the CP should ensure that their CPE gives strict priority to upstream voice frames.

Any VLAN tags added to upstream packets shall be treated as payload by the SOGfast service.

4.2.5 Modem UNI Port Loopback Testing

Requirements as defined in STIN520.

4.3 Openreach Provided Modem Product Variant

As per STIN520. Openreach can provide the modem on a trial basis but the CP will still need to provide a suitable router/hub.

4.4 CP Provided Modem Product Variant

Requirements as defined in STIN520.

Note that support of analogue telephony devices over SOGfast will require either an internal or an external ATA to be included with the modem/router so that the analogue telephony devices can be plugged directly into the ATA. In cases where additional devices on home extension wiring need to be fed by the ATA, a special interface is needed cable to connect the ATA to the voice re-injection socket on the NTE5 SOGfast faceplate will be required. This SOGfast faceplate isolates the voice reinjection from the Openreach network and is required to give reliable analogue voice service from the ATA.

4.4.1 Physical Network Termination

Requirements as defined under this same topic in the VDSL2 section, with the following exceptions:

4.4.1.1 Examples of compatible faceplates:

The same examples apply, with the exception of the 'NTE5C with SSFP' that in case of SOGfast/FTTC(G.fast) looks like this:

4.4.1.2 Configurations of NTE and faceplates to support SOGfast

Pre-existing type of NTE & Faceplate (before SOGfast Provision)	Any home wiring extensions?	Is VRI needed	Minimum to achieve best performance	Ideal
NTE5A/C with standard CCU faceplate and micro filter	no	no	Upgrade to G.fast micro filter	Upgrade to NTE5C with G.fast SSFP
	yes	no	Upgrade to NTE5C with G.fast SSFP	← use this
	yes	yes	Upgrade to NTE5C with SO-VRI front plate	← use this
NTE5A with SSFP	no	no	Upgrade to NTE5C with G.fast SSFP	← use this
	yes	no	Upgrade to NTE5C with G.fast SSFP	← use this
	yes	yes	Upgrade to NTE5C with SO-VRI front plate	← use this

4.4.2 Street Access Physical Realisation

Not Applicable to SOGEA.

5. CPE Requirements for SOGEA over G.fast

Requirements as defined in STIN520.

5.1 Scope

Requirements as defined in STIN520.

5.2 Requirements

Requirements as defined in STIN520.

5.2.1 Physical Connection

Requirements for G.fast modem as defined in STIN520. The ATA will require a BT plug to enable it to be connected to the POTS port on the faceplate.

5.2.2 G.fast Physical Layer

Requirements as defined in STIN520.

5.2.3 Ethernet Layer

Requirements as defined in STIN520.

5.2.4 WAN VLAN Layer

Requirements as defined in STIN520.

5.2.5 Ethernet OAM

Requirements as defined in STIN520.

5.2.6 CPE G.fast Filter Requirements

5.2.6.1 Centralised CPE G.fast filter device requirements

See G.fast STIN?

5.2.6.2 Distributed CPE G.fast Filter Requirements

Requirements as defined in STIN520.

5.2.6.3 Additional Notes About CPE Filters

Requirements as defined in STIN520.

5.2.7 Supplementary Information

Requirements as defined in STIN520.

5.2.8 Analogue Telephony Adaptor

If the CP equipment contains an ATA and there is any intention or likelihood to connect the ATA to the home wiring to drive additional telephony devices, a SOGEA/SOGfast front-plate must be fitted

as defined in section 4.4.1. This is in order to prevent unexpected and potentially harmful voltages from being passed from the ATA/home wiring to the Openreach network. Openreach is concerned that floating voltages or voltages positive with respect to earth may have a harmful effect on its network.

If the ATA/home wiring is not isolated by use of one of the SOGEA/SOGfast face-plates, problems may occur that prevent the ATA from functioning correctly e.g. off/on–hook detection.

Openreach may deploy test mechanisms to detect and report the use of non-isolated ATA equipment – refer to the SOGfast trial contract for further information.

5.2.9 SOGEA/SOGfast Faceplate

SOGEA/SOGfast front-plates may contain passive electrical signatures that will allow Openreach to determine which type of face-plate is attached to the circuit. These circuits do not change the electrical properties of the line as defined in SIN349 [3].

As part of the SOGfast trial Openreach may conduct experiments into the long term effects of the presence and absence of wetting current on SOGfast circuits –faceplates may contain a wetting current sink that is triggered by an A-B voltage above the normal PSTN line voltage. Voltages from the ATA/home wiring will not trigger the wetting current sink, as the home wiring side is DC isolated.

CPs should note that the SOGEA/SOGfast face-plate must be removed and replaced with an appropriate alternative if the service is changed to include standard WLR or MPF.

NOTE: The NTE5C back plate contains the standard termination/ringing components across the A/B pair of a 470k Ohm resistor in series with a 1.8uF capacitor, with the bellwire ringing signal being generated at the union between the resistor and capacitor.

6. References

[1]	SIN498	Generic Ethernet Access Fibre to the Cabinet (GEA-FTTC) Service and Interface Description
[2]	SIN351	BT Public Switched Telephone Network (PSTN): Technical Characteristics Of The Single Analogue Line Interface
[3]	SIN349	BT Metallic Path Facility, Interface Description
[4]	STIN520	GEA-NGA2 G.fast Pilot, Service and Interface Description

For information on where to obtain these referenced documents, please see the document sources list at http://www.btplc.com/sinet/

7. Abbreviations

ATA	Analogue Telephony Adaptor
AELEM	Alternate Electrical Length Estimation Methodology
ANFP	Access Network Frequency Plan
CCU	Customer Connection Unit
CP	Communication provider
CPE	Customer Premise Equipment
CVLAN	Customer VLAN
DLM	Dynamic Line Management
eMLC	Manage Line Characteristics (a Dialogue Service for pre-order enquires)
MFL	Main Fault Location
MPF	Metallic Path Facility
PCP	Primary Cross-connect Point (aka cabinet)
PCP	Priority Code Point aka 802.1p priority
POTS	Plain Old Telephony Service
PSTN	Public Switched Telephony Network
QLN	Quiet Line Noise
SIN	Suppliers' Information Note (BT Publication)
SOGEA	Single Order Generic Ethernet Access
SOGfast	SOGEA over G.fast
SSFP	Service Specific Face Plate
STIN	Suppliers' Trial Information Note (BT Publication)
UPBO	Upstream Power Back-off
VLAN	Virtual Local Area Network
VDSL2	Very high Speed Digital Subscriber Line (Second generation)
WLR	Wholesale Line Rental

8. History

Issue	Date	Changes
Issue 1	8th October 2015	First version
Issue 1.1	January 2016	Additional text added to Sections 3.2.8 and 3.2.9. Section 1.1 updated to specify a CP modem with either an internal or an external ATA.
Issue 1.2	January 2017	Annual review. Additional text added for clarification.
Issue 1.3	March 2018	Annual review. Updated to include requirements for SOGEA over G.fast and updates to Service Availability (Trial and Pilot locations). Includes new sections on: 1.3 SOGEA NETWORK ARCHITECTURE 1.4 THE COPPER PAIR ASSOCIATED TO A SOGEA SERVICE 1.5 CONDITIONS ON THE LINE FROM THE COPPER EXCHANGE 1.6 THE GEA SERVICE TEST AND RAISING A TOUBLE REPORT 1.7 TEST OK 1.8 RECOMMENDATIONS FOR IP OR ATA VOICE SERVICES Also: • Examples of compatible faceplates • Typical deployment scenarios without the use of extensions • Typical deployment scenarios with the use of extensions (Voice Re-Injection)

Annex A Test Requirements for SOGEA Over VDSL2

This Annex provides a detailed breakdown of the modem conformance tests (MCT) requirements to enable a piece of vendor CPE to be validated against the CPE Requirements defined in Section 3 of this document. This is largely based on the requirements of SIN498 [1] with any specific requirements for SOGEA shown in the relevant sub-sections.

A.1 Test Configuration

Requirements as defined in SIN498.

All physical layer tests should be performed with the CPE modem connected to a SOGEA isolating faceplate fitted to an NTE5C unless otherwise stated.

A.1.1 Band Profiles

Requirements as defined in SIN498.

A.1.2 Loops

Requirements as defined in SIN498.

A.1.3 Plain Old Telephony Service (POTS)

Not required for SOGEA

A.1.4 Crosstalk

Requirements as defined in SIN498.

A.2 Network Equipment

Requirements as defined in SIN498.

A.3 Test Equipment

Requirements as defined in SIN498.

A.3.1 Details of Impedance Matching Network

Requirements as defined in SIN498.

A.4 Modem Conformance test (MCT) Requirements for SOGEA

Requirements as defined in SIN498.

A.4.1 Initial Gating Tests

Requirements as defined in SIN498.

A.4.1.1 Synchronisation

Requirements as defined in SIN498.

A.4.1.2 Network Interference

Requirements as defined in SIN498.

A.4.2 Modem Conformance Tests

See Section 3 for details of the specific requirements to which these conformance tests refer.

A.4.2.1 Physical Layer Tests

Each of the followings Sections defines the test required to demonstrate compliance to a particular requirement of STIN517. The requirement number is shown in brackets after the title of the test.

A.4.2.2 Physical Connection (R.PHY.1)

Requirements as defined in SIN498.

A.4.2.3 VDSL2 Layer

A.4.2.3.1 Support of Mandatory Requirements of G.993.2 (R.VDSL2.1)

Requirements as defined in SIN498.

A.4.2.3.2 Support of Profile 17A and 998ADE17 Band Plan (R.VDSL2.2 and R.VDSL2.5)

Requirements as defined in SIN498.

A.4.2.3.3 Compliance with BT ANFP Part C (R.VDSL2.4)

Requirements as defined in SIN498.

A.4.2.3.4 Support of Cabinet Based VDSL2 Operation (R.VDSL2.6)

Requirements as defined in SIN498.

A.4.2.3.5 Support of UPBO (R.VDSL2.7)

Requirements as defined in SIN498.

A.4.2.3.6 Support of U0 Band (R.VDSL2.8)

Requirements as defined in SIN498.

A.4.2.3.7 Support of Seamless Rate Adaptation (R.VDSL2.9)

Requirements as defined in SIN498.

A.4.2.3.8 Support of Downstream Retransmission (R.VDSL2.10)

Requirements as defined in SIN498.

A.4.2.3.9 Support of Upstream Retransmission (R.VDSL2.11) – Optional

Requirements as defined in SIN498.

A.4.2.3.10 Support of Vectoring (R.VDSL2.12)

Requirements as defined in SIN498.

A.4.2.3.11 Support of AELEM (R.VDSL2.13)

Requirements as defined in SIN498.

A.4.2.3.12 Support of Bit Swap (R.VDSL2.15)

Requirements as defined in SIN498.

A.4.2.3.13 Correct Reporting of Vendor Information (R.VDSL2.16)

Requirements as defined in SIN498.

A.4.2.3.14 Correct reporting of Key Test and Diagnostic Parameters

Requirements as defined in SIN498.

A.4.2.3.15 Verification of Hlog and QLN

Requirements as defined in SIN498.

A.4.2.4 Ethernet Layer

A.4.2.4.1 Ethernet Frame Size (R.ETH.1)

Requirements as defined in SIN498.

A.4.2.5 WAN/VLAN Layer

A.4.2.5.1 Support of IEEE 802.1Q VLAN Encapsulation (R.WAN.1)

Requirements as defined in SIN498.

A.4.2.5.2 Ingress Frames Encapsulated Within IEEE 802.1Q VLAN (R.WAN.2)

Requirements as defined in SIN498.

A.4.2.5.3 Simultaneous Support of Multicast and Unicast over the same VLAN (R.WAN.3)

Requirements as defined in SIN498.

A.4.2.5.4 Ethertype Field of Ethernet Frame Set to 0x8100 on Ingress to Openreach UNI (R.WAN.4)

Requirements as defined in SIN498.

A.4.2.5.5 CVLAN Canonical Format Indicator Set to 0 on Ingress to Openreach UNI (R.WAN.5)

Requirements as defined in SIN498.

A.4.2.5.6 VLAN ID Set to 101 (R.WAN.6)

Requirements as defined in SIN498.

A.4.2.5.7 IGMP Reports Encoded Correctly (R.WAN.7)

Requirements as defined in SIN498.

A.4.2.5.8 Multicast Frames Detected and Processed Correctly (R.WAN.9)

Requirements as defined in SIN498.

A.4.2.6 OAM Layer

A.4.2.6.1 Support of Loop Back Messages (R.OAM.2)

Requirements as defined in SIN498.

A.4.2.6.2 Support of 802.3AH Loopback (R.OAM.3)

Requirements as defined in SIN498.

A.4.2.6.3 Support of 'Dying Gasp' (R.OAM.4)

Requirements as defined in SIN498.

A.4.2.6.4 Correct Reporting of Key test and Diagnostic Parameters (R.VDSL2.17)

Requirements as defined in SIN498.

A.4.2.7 CPE Filters

R.FILTER.1 Centralised Splitters

Not Applicable to SOGEA

R.FILTER.2 Distributed Splitters (i.e. micro-filters)

Requirements as defined in SIN498.

A.4.3 SOGEA Testing

A.4.3.1 Transmission Performance Testing

In addition to the tests defined above, the transmission performance of the CPE will also need to be measured against the current Live GEA reference models. This will involve the modem performance being evaluated with the DSLAM configured to implement both fast and retransmission profiles.

A.4.3.1.1 Deployment Scenario 1 - CPE plugged directly into NTE5C

Description – This test gives an indication of how a SOGEA CPE would perform if connected to the Openreach GEA network as part of a SSFP based deployment scenario (i.e. no home wiring). It is also used to record a bench-mark of the CPE modem's performance against the current (i.e. LIVE) network firmware which can then be used to check whether the transmission performance of the CPE modem is adversely affected by future network upgrades. Testing should be performed using both FAST and RETRANSMISSION operation.

Test Description (FAST) –

1. Configure DSLAM to implement an ESEL value of 30dB and the default band profile (O2_0_6_36_1_6_18_1).
2. Connect CPE to DSLAM using the test setup shown in Figure 2.
3. Set line simulator to a loop length of 200m with the appropriate crosstalk injected at each end of the system.
4. Record time taken for the CPE to attained synchronisation. This shall be <90s on all loops regardless of line length.
5. Wait 2 minutes for system to stabilise then record key transmission performance parameters (data rate, margin etc.) from EMS.
6. Repeat steps 3 to 5 for 500m, 1000m, 1500m, 2000m and 2200m cable lengths.
7. Repeat for ESEL values of 10 and 50dB.
8. Repeat for all current combinations of Openreach DSLAMs and line cards.

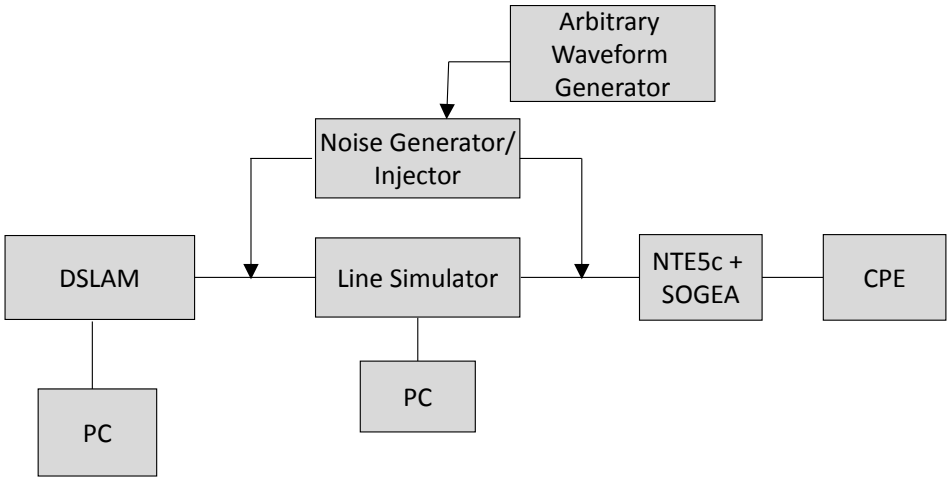


Figure 2 : Test Configuration for Measuring Transmission Performance (CPE plugged directly into NTE5C)

Test Description (RETRANSMISSION) –

As for FAST operation but using the appropriate open retransmission profile (O2_3_6_36_3_6_18_3)for each loop length and ESEL.

ESEL values	Lengths
10 dB, 30 dB, 50 dB	200m, 500m, 1000m, 1500m, 2000m, 2200m

Table 1 : ESEL Values and Loop Lengths for Retransmission Testing

Expected Outcome – This test will provide an indication on how the SOGEA CPE performs when connected to the current Openreach GEA network for both fast and interleaved operation.

A.4.3.1.2 Deployment Scenario 2 : CPE plugged directly into wired extension

Description – This test gives an indication of how a SOGEA CPE would perform if connected to the Openreach GEA network as part of a deployment scenario using microfilters and home wiring). Comparing the results against those obtained from an SSFP based deployment scenario (i.e. no home wiring) will give an indication on how the CPE performance is affected by bridged taps caused by telephony extensions in the customer's premises. In this configuration, the three lengths of cable (7m, 12m and 20m) connected to the NTE5 (the demarcation point in the customer's premises where the Openreach network terminates) are representative of telephony wiring extensions and are specifically chosen to introduce notches in the VDSL downstream and upstream frequency bands. Testing should be performed using both FAST and RETRANSMISSION operation.

Test Description (FAST) –

1. Configure DSLAM to implement an ESEL value of 30dB and the default band profile (O2_0_6_36_1_6_18_1).
2. Connect CPE to DSLAM using the test setup shown in Figure 3.
3. Set line simulator to a loop length of 200m with the appropriate crosstalk injected at each end of the system
4. Record time taken for the CPE to attained synchronisation. This shall be <90s on all loops regardless of line length.
5. Wait 2 minutes for system to stabilise then record key transmission performance parameters (data rate, margin etc.) from EMS.
6. Repeat steps 3 to 5 for 500m, 1000m, 1500m, 2000m and 2200m cable lengths.
7. Repeat for ESEL values of 10 and 50dB.
8. Repeat for all current combinations of Openreach DSLAM and line cards.
9. Compare results against those obtained for a for the deployment scenario with the SOGEA modem plugged directly into the NTE5c to determine impact of telephony extension wiring on CPE modem performance.

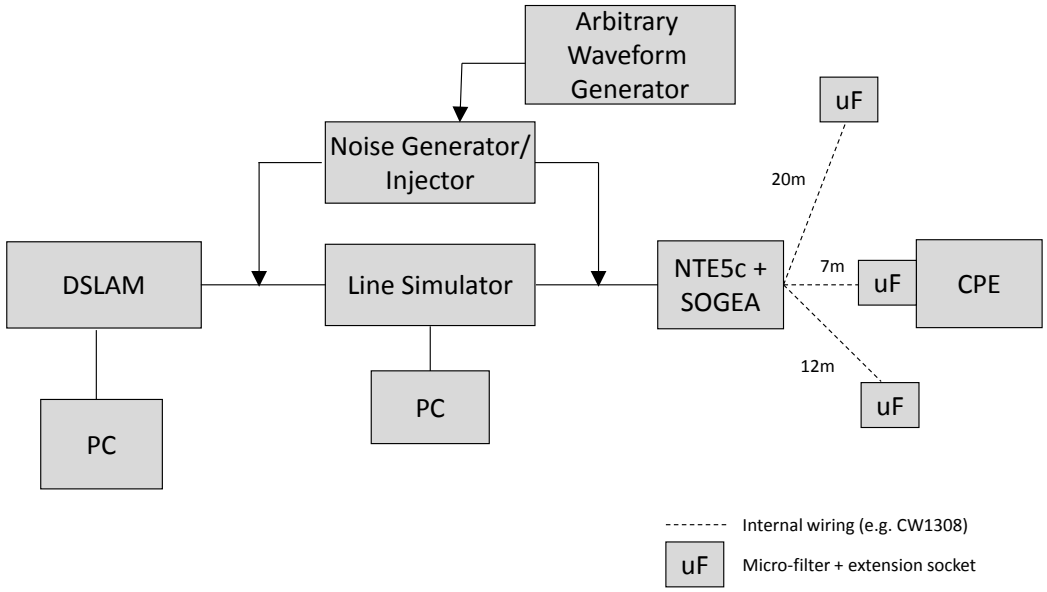


Figure 3 : Test Configuration for Measuring Transmission Performance (CPE plugged directly into wired extension)

Test Description (RETRANSMISSION) –

As for FAST operation but using the open retransmission profile O2_3_6_36_3_6_18_3.

Expected Outcome – This test will provide an indication on how the SOGEA CPE performs when connected to the current Openreach GEA network for both fast and retransmission operation.

A.4.3.2 Verification of 'Router Only' Functionality

Requirements as defined in SIN498.

Annex B Test Requirements for SOGEA Over ADSL2

Not Applicable for SOGEA

Annex C Test Requirements for SOGEA Over G.fast (SOGfast)

This Annex provides a detailed breakdown of the modem conformance tests (MCT) requirements to enable a piece of vendor CPE to be validated against the CPE Requirements defined in Section 5 of this document. This is largely based on the requirements of STIN520 [4] with any specific requirements for SOGfast shown in the relevant sub-sections.

<To be updated when STIN520 has been updated>

-END-