



Industry All IP (Voice) Event

23 March 2018   Ofcom, Riverside House, London

Welcome

NICC Standards Limited –

- Standards and Best Practice Guides for delivering Voice over Broadband
- Impacts on DTMF and Special Services and Best Practice Guide
- Plans, standards and testing

Domestic arrangements

Friday 23rd March 2018

Ofcom – Riverside House London

10:30 to 12:30

- Fire alarms
- Hospitality

Purpose

- Data over voice is not going to work or supported in the same way – discuss



Agenda

- **NICC introduction to NICC Standards Limited**
  - **Ofcom - PSTN migration**
    - **NICC relevant work groups and publications**
      - **ND1704 and technical standards and guides**
        - **DTMF best practice**
        - **Security best practice**
          - **Testing and Ofcom**
            - **BT test labs**
              - **Plans and new standards**
              - **Q&A's**



NICC Standards Limited

NICC®
UK Interoperability Standards

The home of network interoperability standards

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Developing interoperability standards for the UK

NICC is a technical forum for the UK communications sector that develops interoperability standards for public communications networks and services in the UK. It is an independent organisation owned and run by its members.

It is now necessary to be a member to participate in NICC activities.
[Learn more about NICC membership.](#)

The [NICC members' site](#) [login required] contains information about forthcoming meetings, working and draft documentation.

NICC is a trade mark of NICC Standards Ltd.

ITSPA AWARDS

The 2017 ITSPA Awards event was held at The Tower of London on the 9th May 2017. NICC had been entered into the ITSPA Award Pick category for our work on SIP ALG. The other winning entries in the category were from Ofcom and Home SIP Capabilities.

The NICC secretary, Nick Ireland, attended the awards ceremony and presented the winning trophy on behalf of all NICC members for their contribution in producing ND1440.



Latest news

NICC Open Forum and AGM 2017
The NICC Open Forum and AGM 2017 was held at One Great George Street, London on 8 November 2017.
The approved presentations are available in the '[EVENTS](#)' section of the web site

Publications

New NICC standards are now available on the 'Publications' page;
ND1643V5.1.1 - Guidelines on the Minimum Security Controls for Interconnecting Communication Providers
ND1643V4.1.1 - Guidance for Implementing ND1016 in SIP networks
ND1643V4.1.1 - UK SIPconnect Endorsement
ND1643V4.1.1 - Guidance for the use and secure implementation of SIP Application Layer Gateways

[Current work](#)

NICC specifications are being developed for the following technical activities and interfaces:

- ALL IP end to end
- Nuisance Calls and CLI
- SIP NNI and Corporate Network Connection
- IP access to Emergency Services
- Interworking between network protocols
- SIP Overload Control
- Minimum security requires for interconnection CPs
- Overlapping Gfast and VDSL

These and more current work areas are detailed [here](#).

Industry All IP Event

NICC Standards Limited

<http://www.niccstandards.org.uk/>

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Responsible for UK end to end interoperability standards -

- **Specifications**
- **Guidelines**
- **Reports**
- **Test manuals**

MEMBERSHIP

<http://www.niccstandards.org.uk/membership/index.cfm>

NICC Standards Limited - Recent Publications

ND1440 - SIP Application Layer Gateways (ALG)

ND 1519 - Impact of the ETSI M493 architecture in the UK, enterprises to supply a Location Server for emergency services

ND1522 - Implementation of Secure Telephone Identity Revisited (STIR) in the UK

ND1034 - UK SIPconnect Endorsement – impact on enterprises

ND1016 - Requirements for Customer Line Identification Display and other related services

Questions at the end

- Impacts and Timescales
- End to End data standards
- Testing
- Road map/project plan

NICC – delivering voice over broadband networks

The regulatory perspective

Tim Gilfedder, on behalf of Huw Saunders – Director, Network Infrastructure, Ofcom

23rd March 2018



Today's Agenda

- Ofcom's role
- PSTN migration – what's happening, and what is Ofcom doing?
- What are the implications for services that rely on voice services?
- The question of testing

Ofcom's duties and role

Ofcom and our role in UK standards development

- Ofcom is the communications regulator in the UK
  - We regulate the TV, radio and video-on-demand sectors, fixed-line telecoms (phones), mobiles and postal services, plus the airwaves over which wireless devices operate
- We operate under a number of Acts of Parliament, including in particular the Communications Act 2003
  - We must act within the powers and duties set for it by Parliament in legislation
- The Communications Act says that Ofcom's principal duty is to further the interests of citizens and of consumers, where appropriate by promoting competition
  - Meeting this duty is at the heart of everything we do
- Accountable to Parliament, we set and enforce regulatory rules for the sectors for which we have responsibility.
- Ofcom is an observer member of NICC
  - We attend board meetings as well as technical groups (including the All-IP TG that is represented in this workshop)
  - Our role is to oversee and facilitate standards development in light of our underlying duties

PSTN migration - What is happening?

PSTN switch off – a recap

- Incumbent Communications Providers have been looking to migrate from legacy Public Switched Telephone Network (PSTN) systems for some time
  - Many such systems are already obsolescent and support costs are increasing rapidly as both hardware and software are becoming increasingly difficult to maintain
- Replacement strategies are centred on replacing older technology with platforms based on the Internet Protocol (IP) – “Voice over IP”
  - Increasingly based on international standards, which offer multi-vendor support and easier interoperability and interconnection
- These changes affect both the equipment in the core of the network (switches) as well as the connection between the home and the network
  - While initial migration strategies focussed on “emulating the PSTN”, focus is turning to “Voice over Broadband” (VoBB) or “derived voice”
  - With the near universal adoption of broadband for internet access and other services, VoBB allows consolidation on a single access technology and will be the way forward in the UK
    - In some cases, this bearer could be a wireless rather than a fixed line connection

What is Ofcom doing?

- In addition to working with industry, Ofcom is also engaging with other agencies and bodies to communicate the changes that are foreseen and the potential issues that could arise

	Potentially affected services	Government/public bodies contacts
Health	Telecare alarms	NHS/Dept of Health, Devolved Governments Local Government Association/ Ministry of Housing, Communities & Local Government
Finance	Retail card payment terminals ATMs BACs	Payment Services Regulator/ BoE/FCA HMT
Transport	Traffic control and monitoring Comms systems in smaller airports Ticket machines Heritage railways	Civil Aviation Authority Office of Rail and Road Dept of Transport Devolved Governments
Utilities	Network control and monitoring	Ofgem/ Energy UK Ofwat, Other UK regulators
Other	Security & fire alarms Communications systems in lifts Services using ISDN2	Various

Implications for services

What are the issues?

- VoBB cannot guarantee to support those services that have historically relied on conventional (end to end) voice services
  - Most obvious are that those that require “baseband” connectivity such as Redcare and related security applications
  - More broadly, DTMF tone transfer will be affected in ways that may make some security and care alarms malfunction
  - Such problems will also extend to fax machines and other devices that use voice band modems
- This problem is already evident to some degree with VoIP being used by some communications providers in their core networks
  - Increased call failures are being reported, which appear to be due to how calls are routed through multiple networks
  - This problem may also extend to other applications and will need service re-engineering and/or complete service/CPE replacement to rectify
- VoBB will not have the “line powering” capability of the PSTN
  - Telecare and other non-voice services will need alternative power arrangements

NICC standards

- One of the primary objectives of the NICC is to develop standards to ensure interoperability of communication services between and across networks within the UK
  - Agreeing technical specifications for connections between networks
  - Defining individual network performance standards to ensure end to end quality of services that traverse multiple networks
- In recognition of the migration from traditional networking to VoBB, NICC was asked to review relevant standards for voice services
  - The results of this review will be discussed in the following presentations
- Once these standards have been adopted, testing to confirm compliance will inevitably take place
  - There exists the opportunity to better understand the extent to which alarms and other services will operate over these new networks
  - This will be discussed later in this workshop

The question of testing

Testing

Later in this workshop we shall be discussing testing

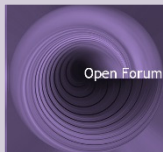
- Testing is unlikely to categorically prove that devices (e.g. alarms) will or will not work over new networks
  - But they can offer valuable insight into the extent and scale of any issues
- This insight can help all parts of the industry
  - Creating mitigation strategies, developing new products, training and augmenting support/call centre staff
- To get the greatest benefit, we need to get consensus across all parties as to:
  - Network configurations
  - End devices
  - Connections to call centres
- Coordination is necessary to agree the most optimum set of test scenarios
- Ofcom believes it is well placed to undertake this coordination role
  - And looks to all parties to support it through all stages of this process



NICC All-IP (Voice)
Task Group
Pasquale Exius-Genco
Group Chair

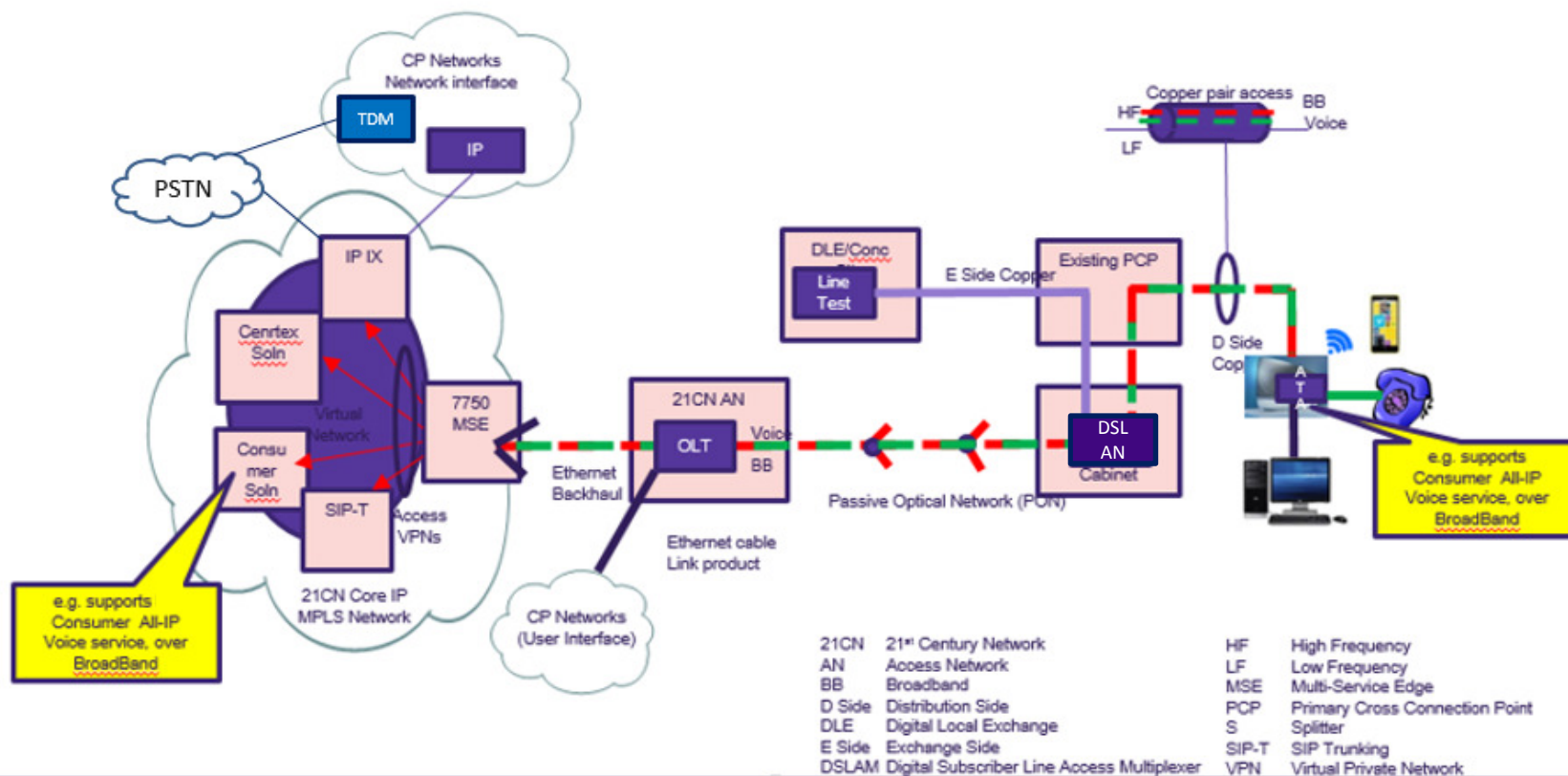
A Communications Industry perspective

- Technology has moved globally from TDM to IP
- Communications Manufactures have mirrored this trend
- Communications companies globally are moving from TDM to IP for all their communications
- Globally PSTN providers have reacted to this trend, their customers are demanding improved (faster & more stable) data products, with associated movement to IP based technology (both fixed and mobile)
- Our UK Regulatory environment is changing to reflect these trends
- We all have a responsibility to manage this change to minimise the customer impact
- NICC ensures that UK standards are current and are developing new standards within the All IP Task Group



Equivalent Products e.g. SOGEA

All IP – Voice over Fibre BroadBand from the Exchange (SoGEA)





PSTN – All IPT solution difference / potential customer impact



Unlike the PSTN, with the migration to ALL IP networks/solutions there is:

- Variable e2e performance (Packet Loss etc.)
  - Packet Loss is higher e2e than with the PSTN,
- Variable Consumer premises Equipment (CPE)/Router/ATA performance
  - e.g. Adaptive De-Jitter Buffering, Dual Tone Multi Frequency (DTMF) detection & generation and Clock/e2e Synchronisation accuracy,
- Complexity with:
  - functional performance interactions involving many different types of different CPE (Home Routers)
  - media and signalling gateway interactions with different gateways (DTMF impacts)
- Call routeing changes with performance impact as e.g. as elements of e2e call routeings change with IP migration/technology change

The above solution differences are far more manageable for voice, rather than Special Services where there is less tolerance of underpinning e2e network performance differences.





NICC All IP Task Group



- Standards engagement – Industry Standards considered essential for effective customer end to end communication
- NICC engagement, collaboration, agreement. Plus, communication and consultancy e.g. regarding the scoping of testing.
  - We believe that our collateral needs to be communicated, understood and used by industry
- NICC Standards in support of All IP (Telephony)
  - E2E QoS Standard
  - CPE compatibility (for voice only) Standard,
  - Security Best Practice Guide
  - DTMF Best Practice Guide
  - SIP Best Practice Guide
    - With Best Practice Guides we really want our guidance to be acted upon
- Special Services Test guidance
  - To enable testing against a common framework



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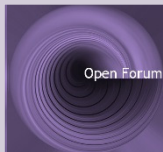
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NICC All-IP (Voice)
Telephony over Broadband
End to End Network
Performance
DTMF Best Practice
John Bicknell



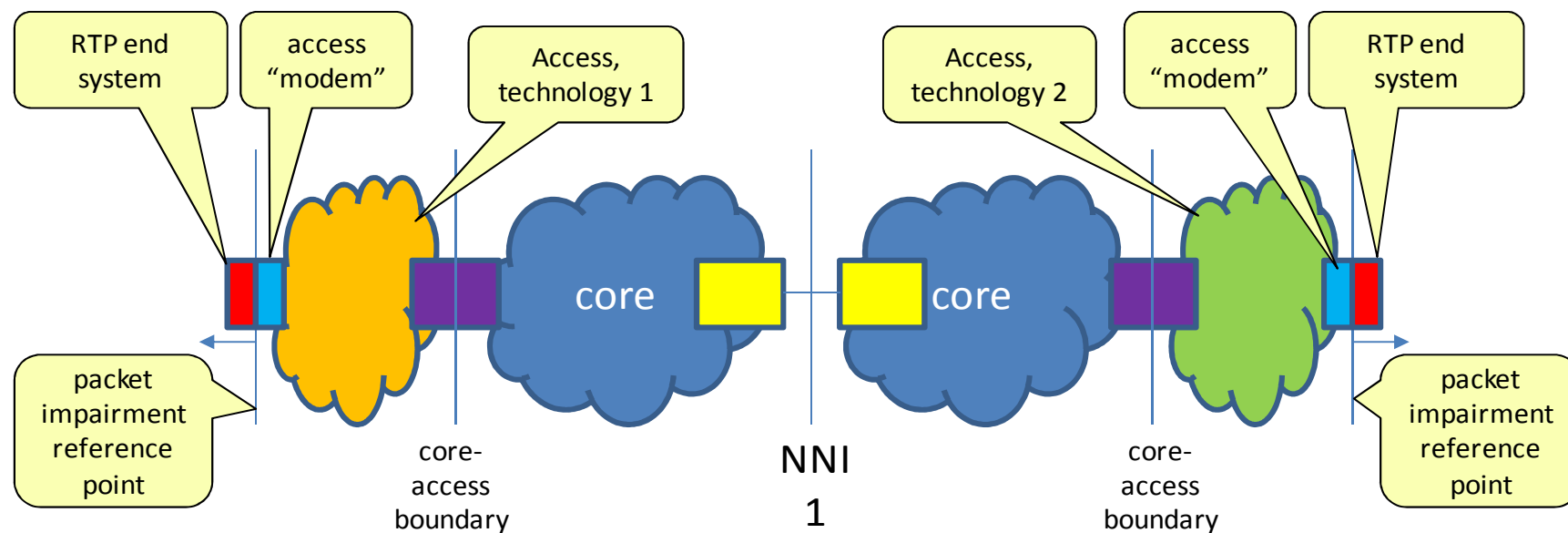
- Editor of ND1704 V3 and ND1444 John Bicknell (BT)
- ND1704
  - ***End to End Network Performance Rules and Objectives for the Interconnect of NGNs***
  - Based on IP (Internet Protocol) Technology
  - Current version 2.1.1 (Published 2011)
  - Network Performance Rules and Objectives:
    - Packet Delay and Delay Variation
    - Codecs
    - Packet Loss
    - Echo Control
    - Post Dial Delay





ND1704

Reference Connection





ND1704

Need for change



- Voice/Speech
  - New codecs with better resilience to IP impairments
  - Potential to enhance Voice Quality
  - Wideband & Super-wideband audio
- Industry drivers – VoBB
  - Ongoing support of Voice-band Data (VBD) and Clearmode hugely problematic for VoBB technology
    - Better served by native IP (Ethernet) solutions?
    - Envisaged move away from data-over-voice-over data

Retain performance objectives for VBD/Clearmode, but deliver fit-for-purpose performance criteria for voice centric services



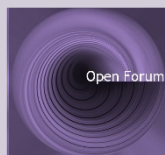


What's new in ND1704



- Service definitions
  - Voice Capable (New)
  - Voice-band Data Capable
  - Clearmode Capable
- Performance Calculator
  - Compiles performance data for delay, jitter, packet loss
- Bursty packet loss objectives for Voice Capable services
- DTMF BPG ND1444 for Voice Capable services





- New service definitions (**Approval Pending**)
  - **Voice Capable:** Reliable transmission of human speech. Reliable transmission of VBD and Clearmode **cannot** be guaranteed. Special provisions **may** be made for ongoing support of some data services such as DTMF (Dual-tone Multi-frequency) for IVR (Interactive Voice Response) purposes.
  - **VBD Capable:** Reliable transmission of voice-band data. Reliable transmission of Clearmode **cannot** be guaranteed.
  - **Clearmode Capable:** Reliable transmission of 64 kbit/s data streams.





Status

- ND1704 V3 – TG approval pending final editorial changes
- ND1744 DTMF BPG – TG Approval



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NICC All-IP (Voice)
Telephony over Broadband
Security Best Practice Guide
Ian Hindle

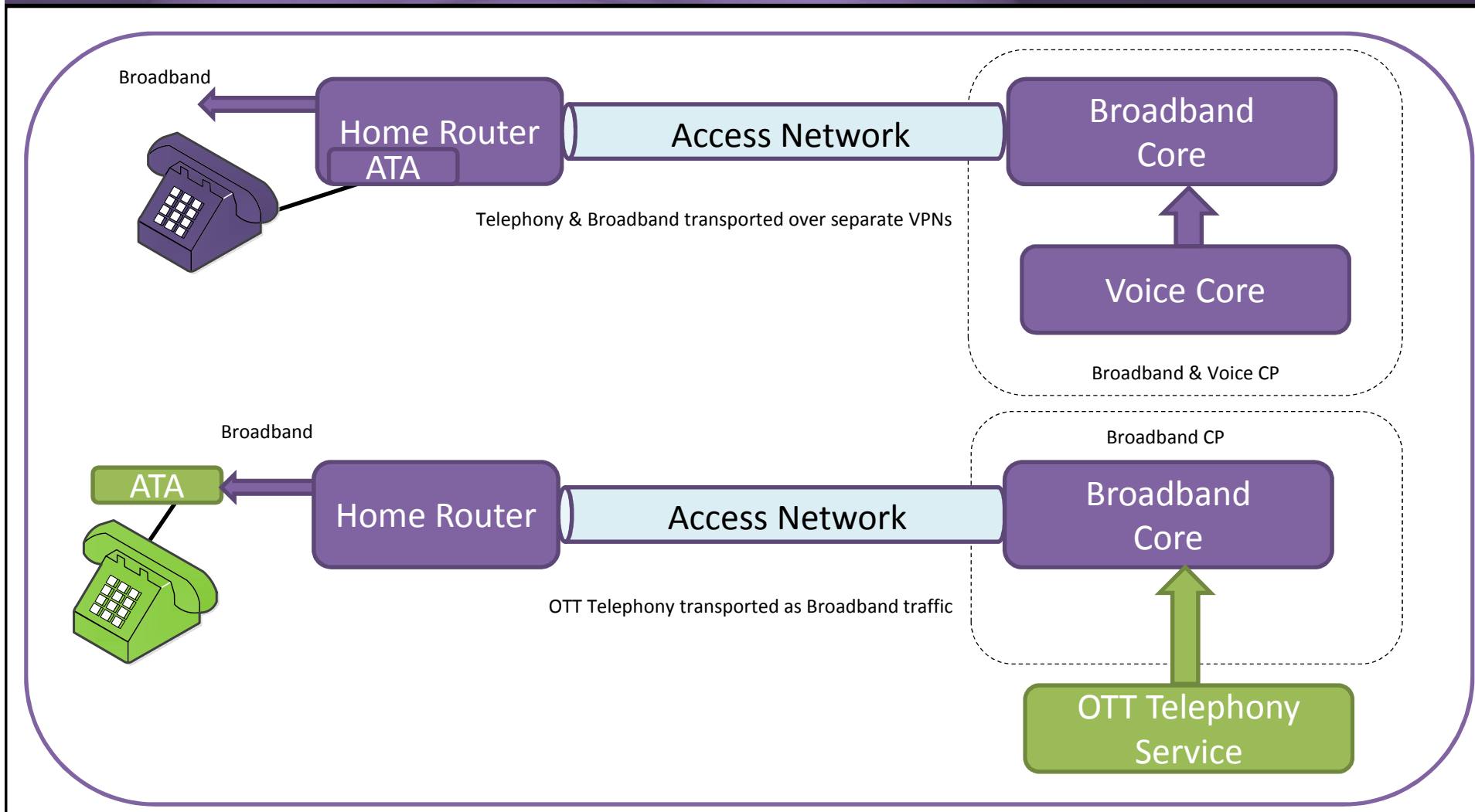
NICC ALL-IP Security Task Group

- Task group chair Steve Covey (BT)
- Telephony over Broadband Security Best Practice Guide - ND1443

Full Title – “Guidelines for the Security of All IP Telephony (All IPT) Service in the UK Telecommunications Network”

“Telephony over Broadband” Security Best Practice Guide

- Scope
  - PSTN like VoIP (Telephony over Broadband) Service
  - Implementation owned by individual CP
  - Service/Platform Architecture
  - Good practice recommendations



Security Best Practice Guide

- Covers
  - Threats to the All IP Service
  - Architecture
    - CPE All-IP Device
    - Access Design/Transport
    - All-IP Platform (e.g. IMS Platform)
- Paradigms
  - Protect / Detect / Survive

Security Best Practice Guide

- Implementation
  - Device / Service “Authentication”
  - Signalling / Transport Security
    - IPSEC/TLS and SSH/http(s)
  - Media Security
    - SRTP
  - SIP Authentication
  - Platform / Device Hardening
  - Fraud Management

Testing – opportunities and motivations

Tim Gilfedder

23rd March 2018



Testing – Specifications, guides and coordination

Testing new IP networks against new NICC standards represents an opportunity to understand the scale of potential issues from legacy devices and services

- Given the end-to-end complexity of network interconnections and the wide variety of current and legacy devices, any comprehensive testing would be both infeasible and unlikely to definitively demonstrate performance under all circumstances
- However, well designed and targeted tests can provide valuable insight in the potential extent of issues of legacy systems operating over new networks
- Communications Providers are already thinking about how to conduct these tests
  - But input from across industry will make these test more relevant and productive
- What follows are the current and developing thoughts from CPs regarding their approach to testing
  - We need to identify any omissions or opportunities to improve
- Real testing over live networks to live ARCs is equally important as lab tests
  - Which will require a degree of coordination and cooperation to derive the maximum benefit

Testing – Specifications, guides and coordination

Discussion and identification of way forward

- Open questions remain:
  - How much coordination between CPs is necessary?
  - What information/assistance can OTT service providers offer?
  - What is the role of NICC and Ofcom in this process?
  - What are the next steps and over what timescales?
- Getting the views from all stakeholders can greatly help in ensuring successful tests
  - So your feedback today is vital



UK Interoperability Standards

NICC All-IP (Voice)

Testing Scenarios

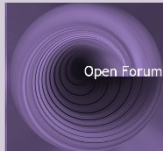
BT

Gordon Cannon

Ben Morley



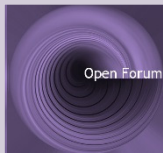
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Test call flows

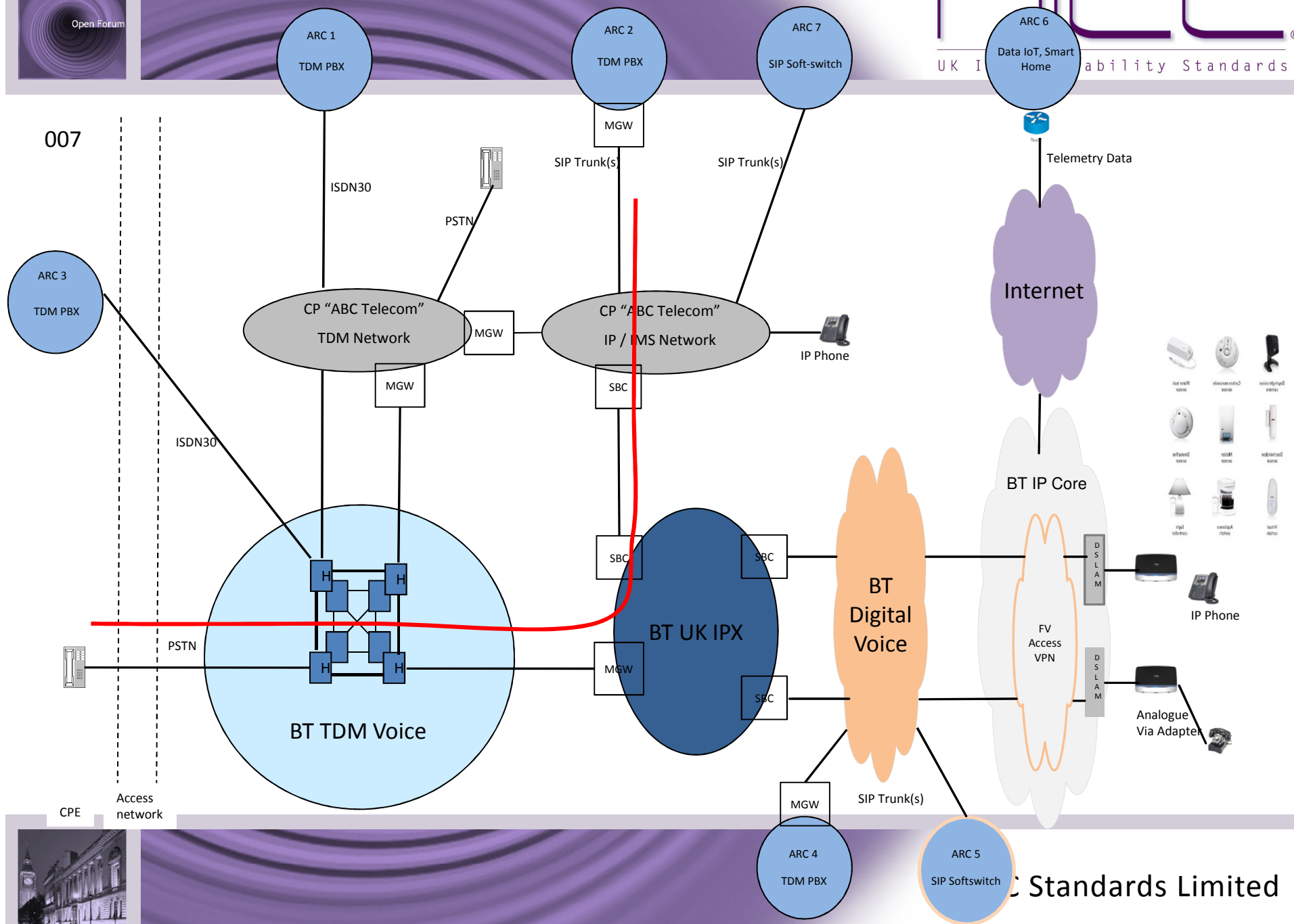
Call Flow Ref	Originating Platform	Terminating Platform (ARC Supplier)	TDM-IP transcoding	Interconnect	Notes
011	BT TDM	Talk Talk TDM	No	Yes	Current Multi-CP "analogue" service (baseline test)
012	BT TDM	Talk Talk IP	Yes	Yes	SIP call server in ARC
013	BT TDM	Talk Talk IP	Yes (x2)	Yes	On premise Media Gateway transcode back to TDM equipment in ARC
014 & 014*	BT IP	Talk Talk TDM	Yes	Yes	could be via UK IPX or via TDM interconnect (2 variants)
015	BT IP	Talk Talk IP	No	Yes	True SIP (IP) end2end
016	BT IP	Talk Talk IP	Yes	Yes	On premise Media Gateway transcode back to TDM equipment in ARC
Repeat these tests with all major communication providers who provide business voice services to ARCs					





Open Forum

007





Ask of ARCs (1)

- Require ARCs hosted on each major CP network to have either TDM or IP technology or both
  - Need native IP (no media gateway technology)
  - Need native TDM (absolutely no IP technology in the call flow)
  - Need Media Gateway IP/TDM i.e SIP trunks but equipment in ARC is still TDM
- Collectively, require ARCs to operate each of main ARC technology suppliers
- Collectively require ARCs to co-operate with testing of each major alarm equipment type
  - currently deployed 'analogue' units
  - Current or planned IP equipment
- Require ARCs that take the core communications on each major CP to provide
  - Permanent test numbers/accounts for use by visitors to the BT Digital Services Lab
  - Ability to provide test logs?
  - Time slots to be agreed in advance





Ask of ARCs (2)

- Support test coverage across full alarm call exchange, including:
  - Incoming protocol (decoding and timing information)
  - Voice call performance (duplex and tone-switched)
  - Control transactions during calls (eg volume control, tone switching, cleardown)
- ARCs to enable testing of all relevant call types, including:
  - 2-way IP
  - IP + TDM call-back
  - Voice-band alarms into IP ARCs
- ARCs to enable testing of all relevant call-handling modes, including:
  - Call receipt and clear-down
  - Call conferencing
  - Call forwarding
  - Housing scheme multi-calls
  - Automated call handling/logging
- Enable testing of all key alarm types
  - Set of types to be agreed in advance (smoke, personal alarm, motion, fall etc)
  - Depends on availability of sensor types





Other testing comments

- We need a definition of pass/fail/partial-fail and for ARC staff to adopt and codify tests as per these definitions eg
  - PASS: All data and call transactions work as intended and to acceptable call quality
  - FAIL: significant failure to handle alarm call, in terms of alarm identity receipt or decoding, or unacceptable call quality
  - PARTIAL-FAIL: Alarm identified and handled without significant risk, but with loss of some functionality or degraded call quality
- Increasingly IP alarms use cellular as primary or back-up. Should we enable a set of tests that originate from selected cellular devices?
- Is there value in establishing main ARC platforms at (or at least accessible only by) BT test facility? Where originating calls could then derive from other comms providers.
- Need prior agreement from ARCs and system providers that test results are reviewed and published – do we create a review body?
- The IP system providers generally operate an associated 'system management' application (to manage addressing, upgrades etc). These may need consideration in the test set-up
- Do we exclude other media types, such as door video calls?
- ARC suppliers to confirm no other connectivity types to be tested

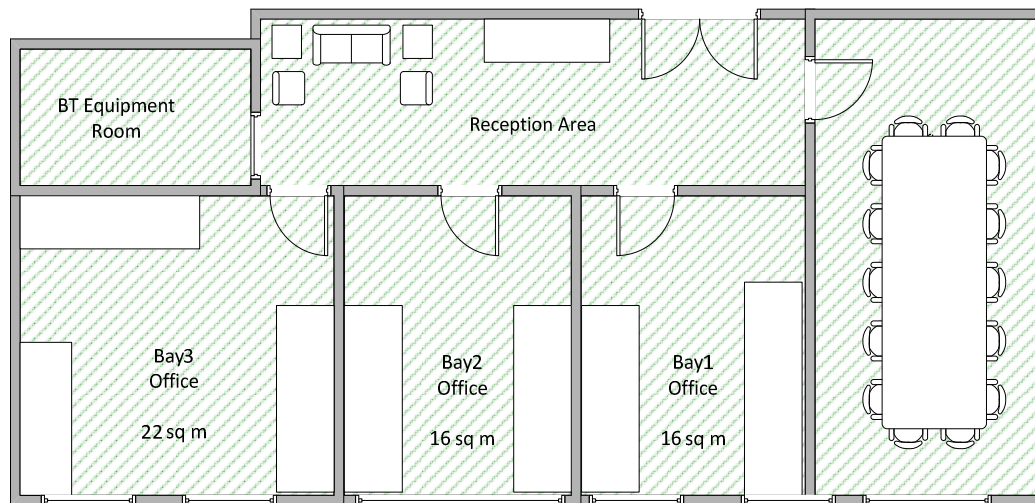




Digital Service Lab Facilities and Infrastructure



- The test facility has three individual & secure labs, plus large meeting room
- Each lab has an identical range of production IP voice services, associated BT CPE (e.g. routers + ATA), and access products
- Configurable Broadband line degradation profiles are available to emulate a range of line conditions e.g. packet loss burstiness
- Configurable In-premises network loading profiles are also available, e.g. HD streaming, for validation of Real Time QoS



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Location & whereabouts

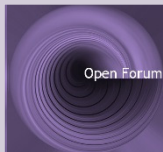
Address

Adastral Park is located near Ipswich, Suffolk on the east coast of England, approximately 90 miles from London and 65 miles from Cambridge.

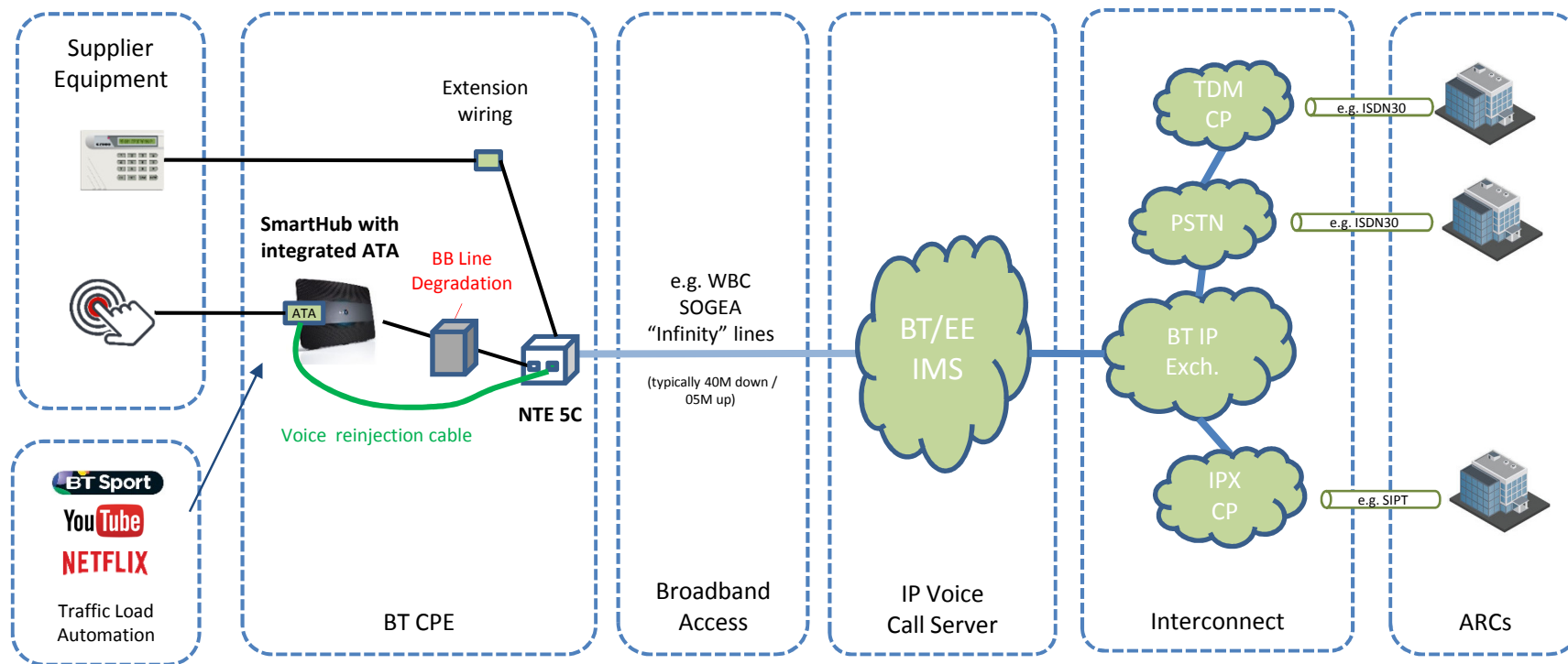
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Martlesham Heath
Ipswich
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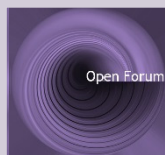
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Example BT Consumer Configuration





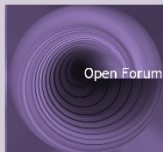
Test scenarios (worked example for Consumer Digital Voice over FTTC)

Test Ref	Customer Scenario	Test Case
0	Benchmark validation test. Supplier equipment connected to PSTN connection on a standard FTTC Broadband enabled line.	a. Outbound call / connection to ARC over PSTN b. Inbound call / connection from ARC over PSTN
1	Simulated conversion from PSTN to Consumer Digital Voice service over SOGEA - New OR faceplate, connect using the ATA port on the router - Test of supplier equipment over new service NB: No line degradation / network loading	a. Equipment response on withdrawal of dial-tone / voltage on line b. Equipment response to use of Voice Reinjection cable c. Outbound call / connection to ARC over IP voice d. Inbound call / connection from ARC over IP voice
2	General use of equipment connected the ATA port on the router	a. Service response under normal line & in-home network loading conditions b. Service response under degraded line conditions (L/M/H) c. Service response under heavy load conditions (L/M/H)
3	General use of equipment connected via Voice Reinjection cable	As above

Please Note: BT are not proposing for ARC equipment to be brought to the labs. Testing will require collaboration with your ARC

Network Routing permutations are determined by ARC connectivity arrangements. Visiting parties should plan for multiple iterations of testing according to their ARC connectivity requirements.





Voice Service and Access technologies available

At Launch

Voice Services

Consumer - Digital Voice

Business & PS – Cloud Phone

Business & PS – Cloud Voice

Access

SOGEA (FTTC)



Future planned scope

Voice Service

Plusnet – Fixed IP voice

EE – Fixed IP Voice

Business & PS - SIPT

Access

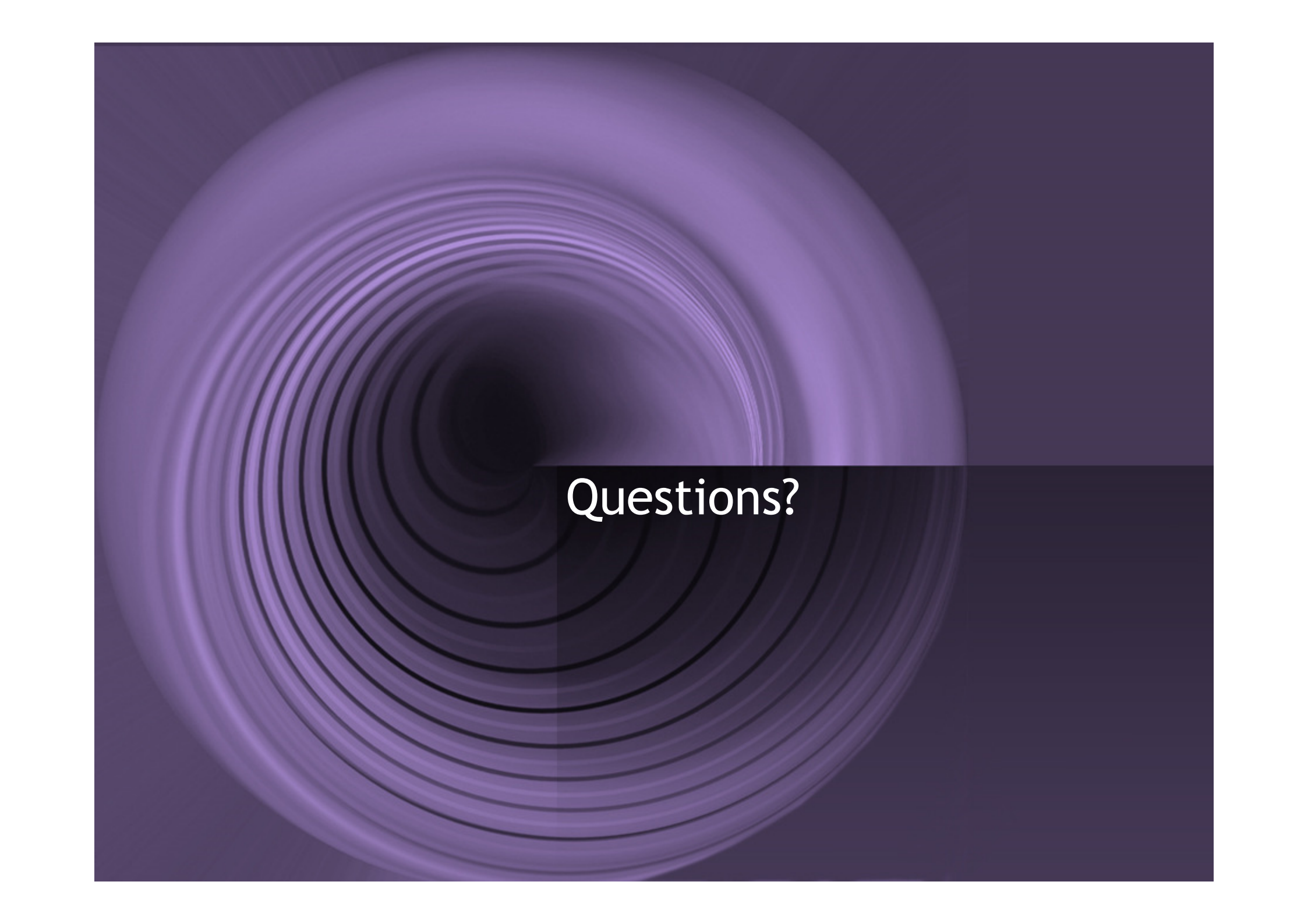
SOG.Fast

FTTP

SO ADSL

*Subject to IP product development
and Openreach rollout plans



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Questions?

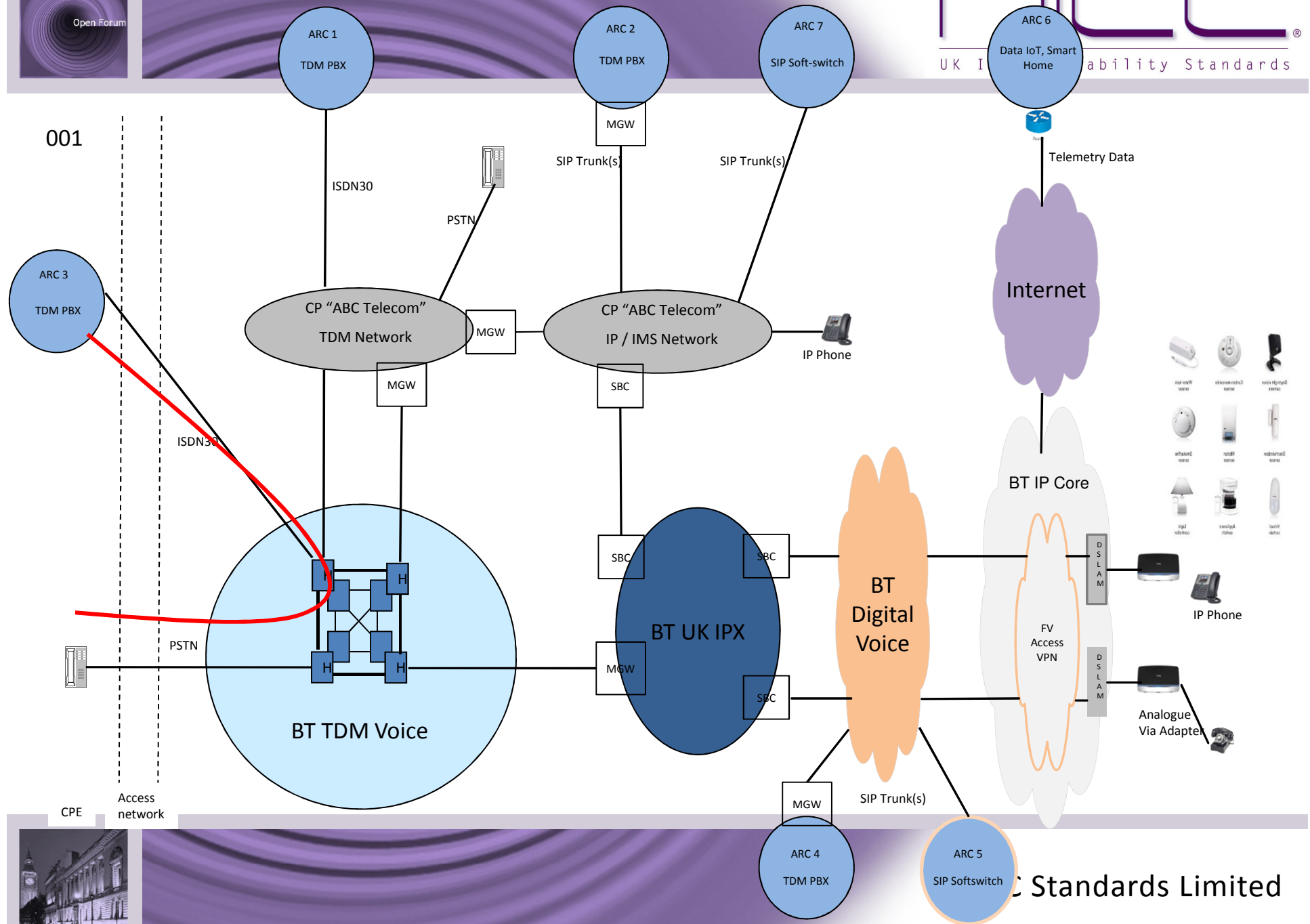
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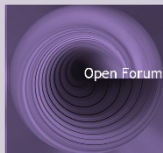
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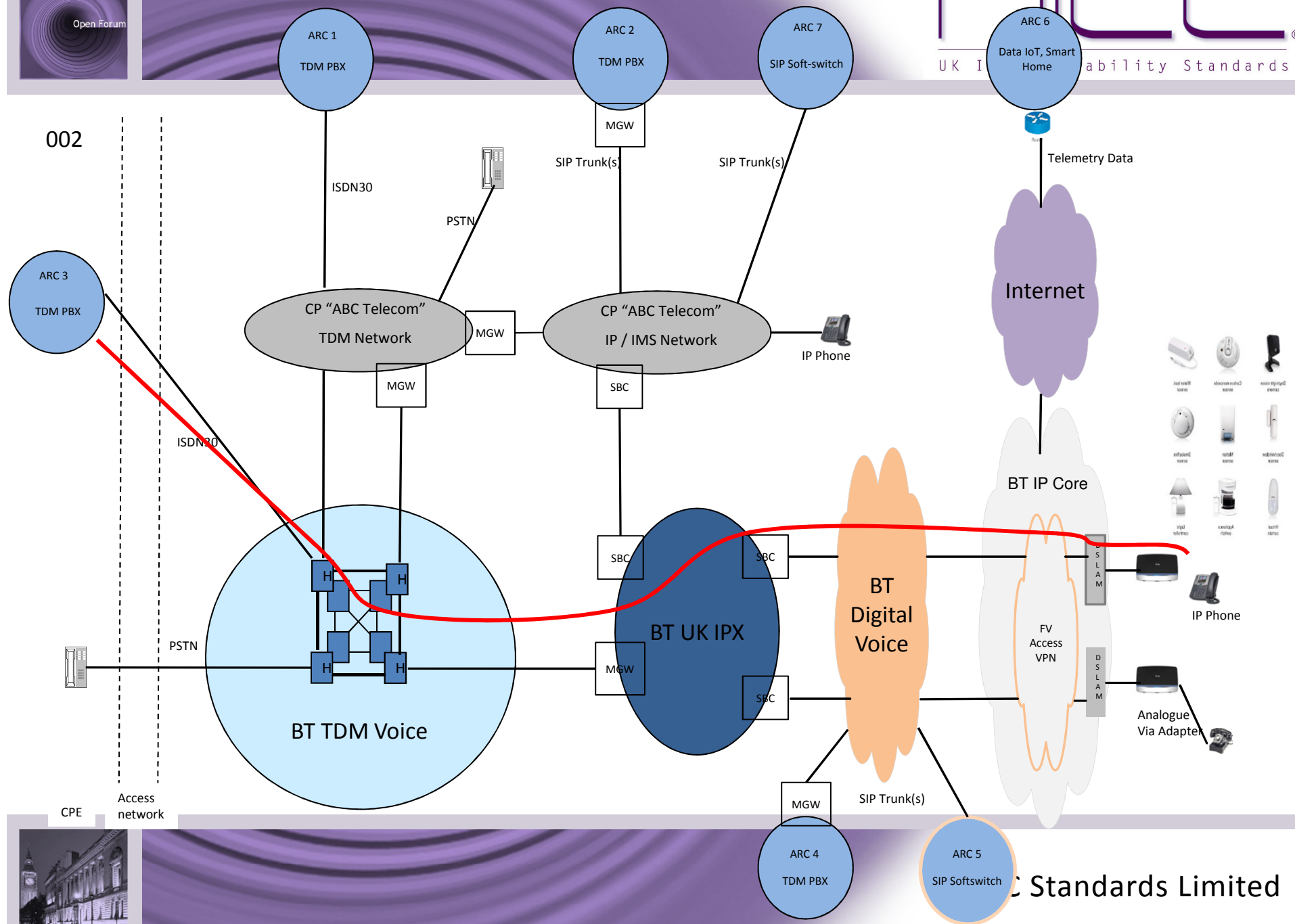
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NICC All-IP (Voice)
Draft
Testing Scenarios

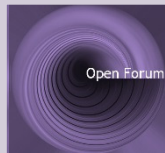




Open Forum

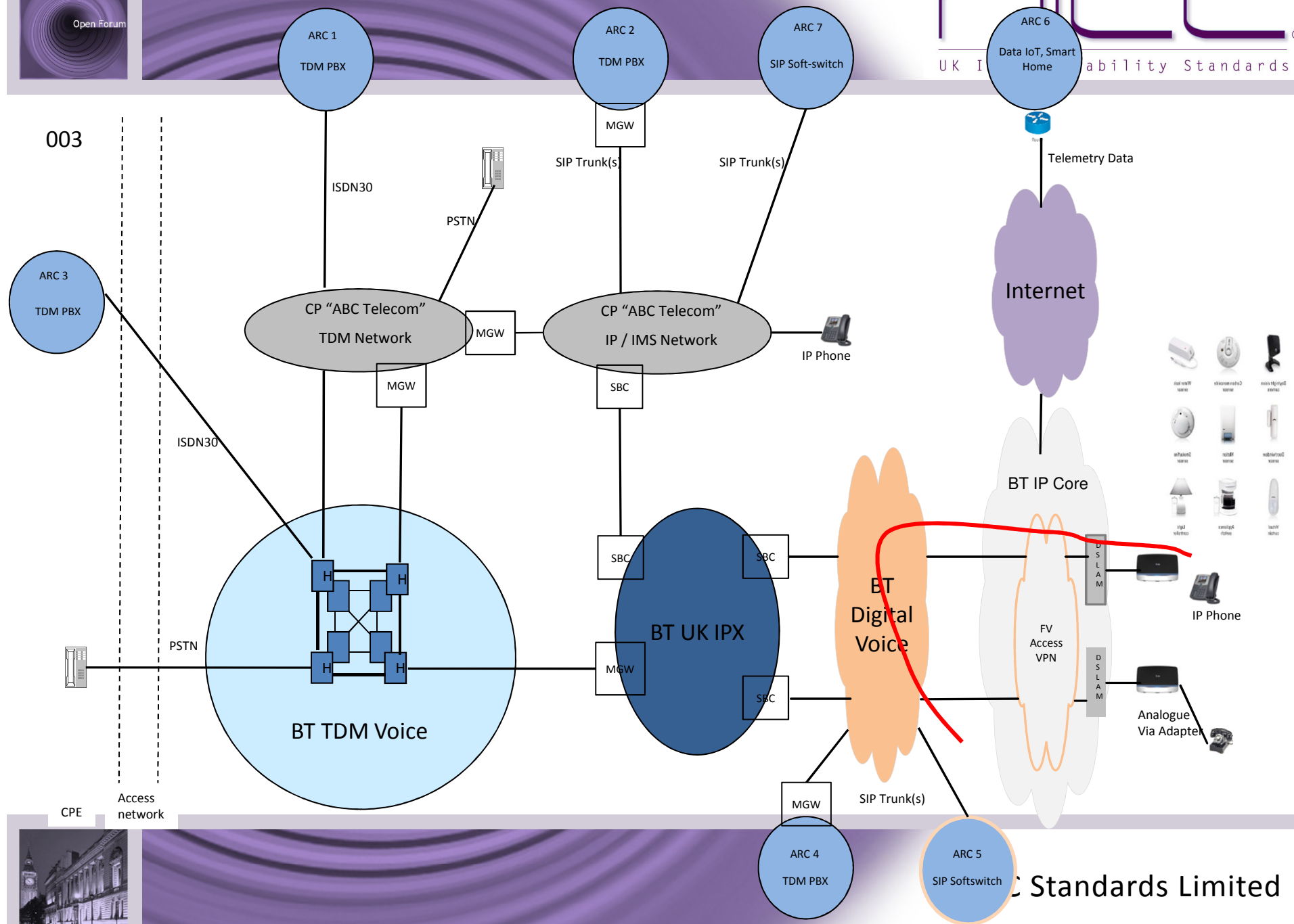
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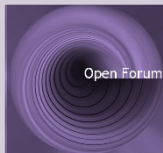




Open Forum

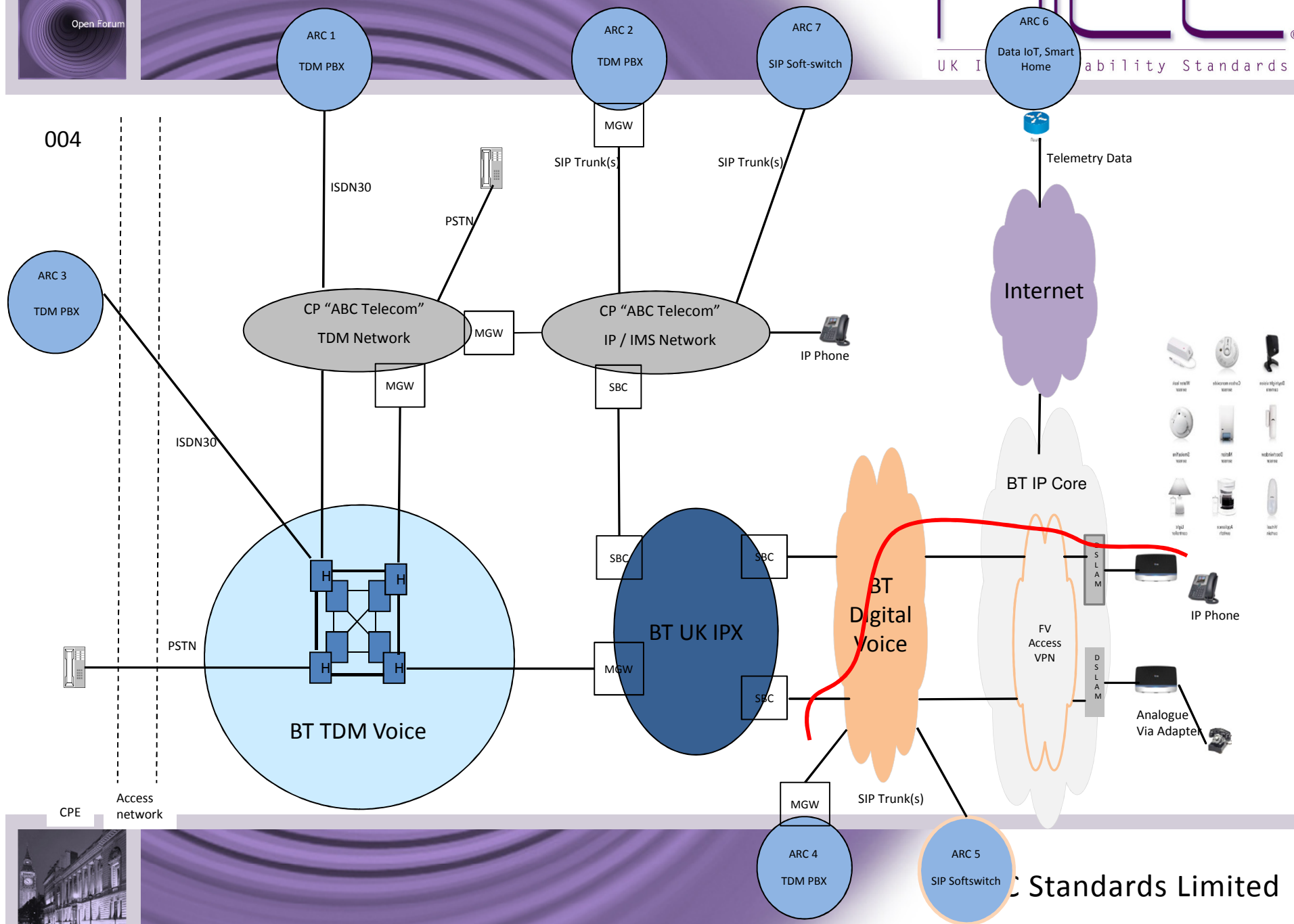
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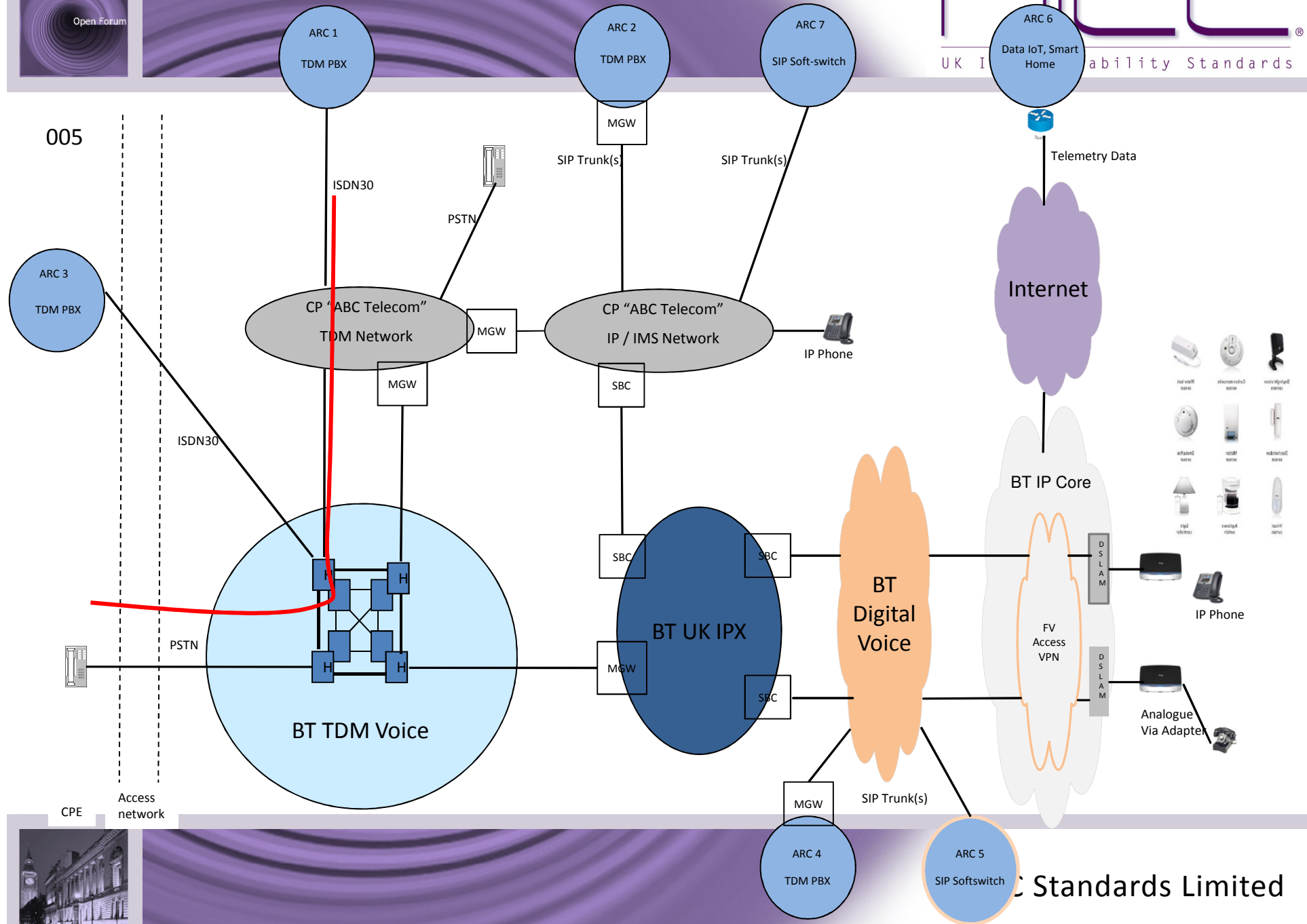
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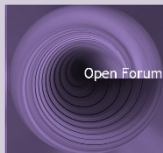
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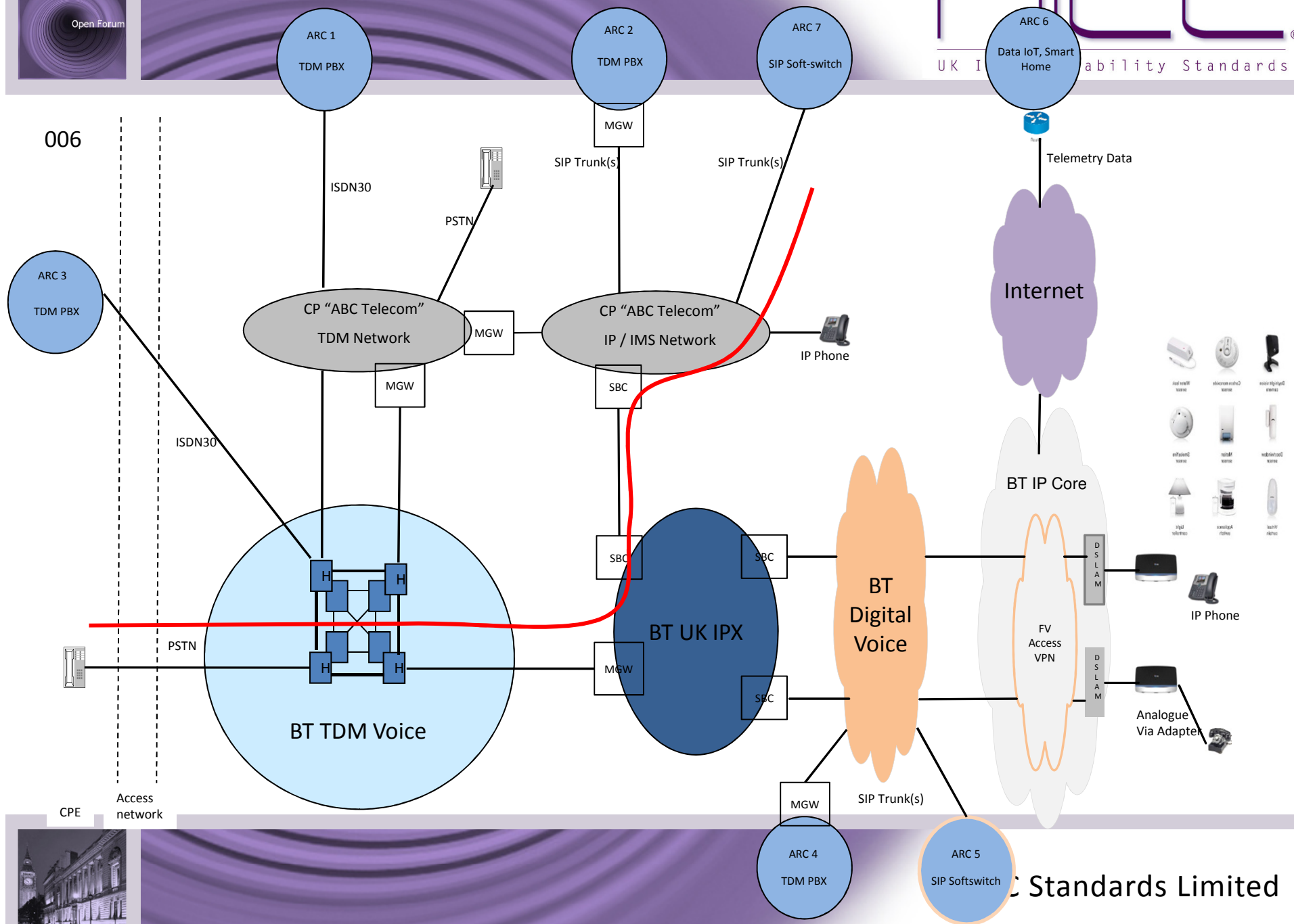
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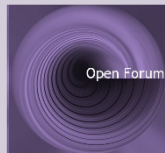




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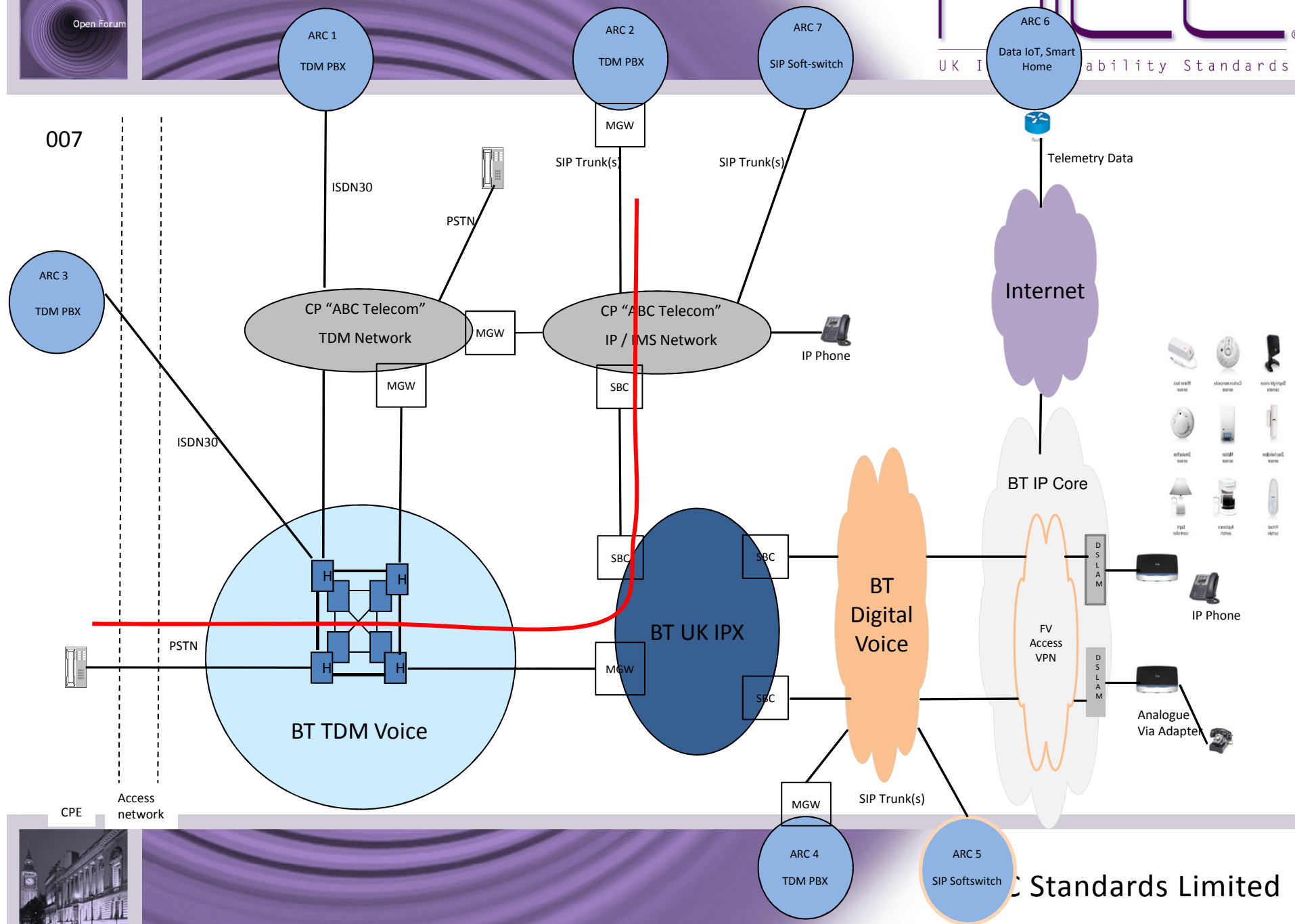
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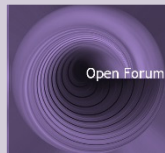




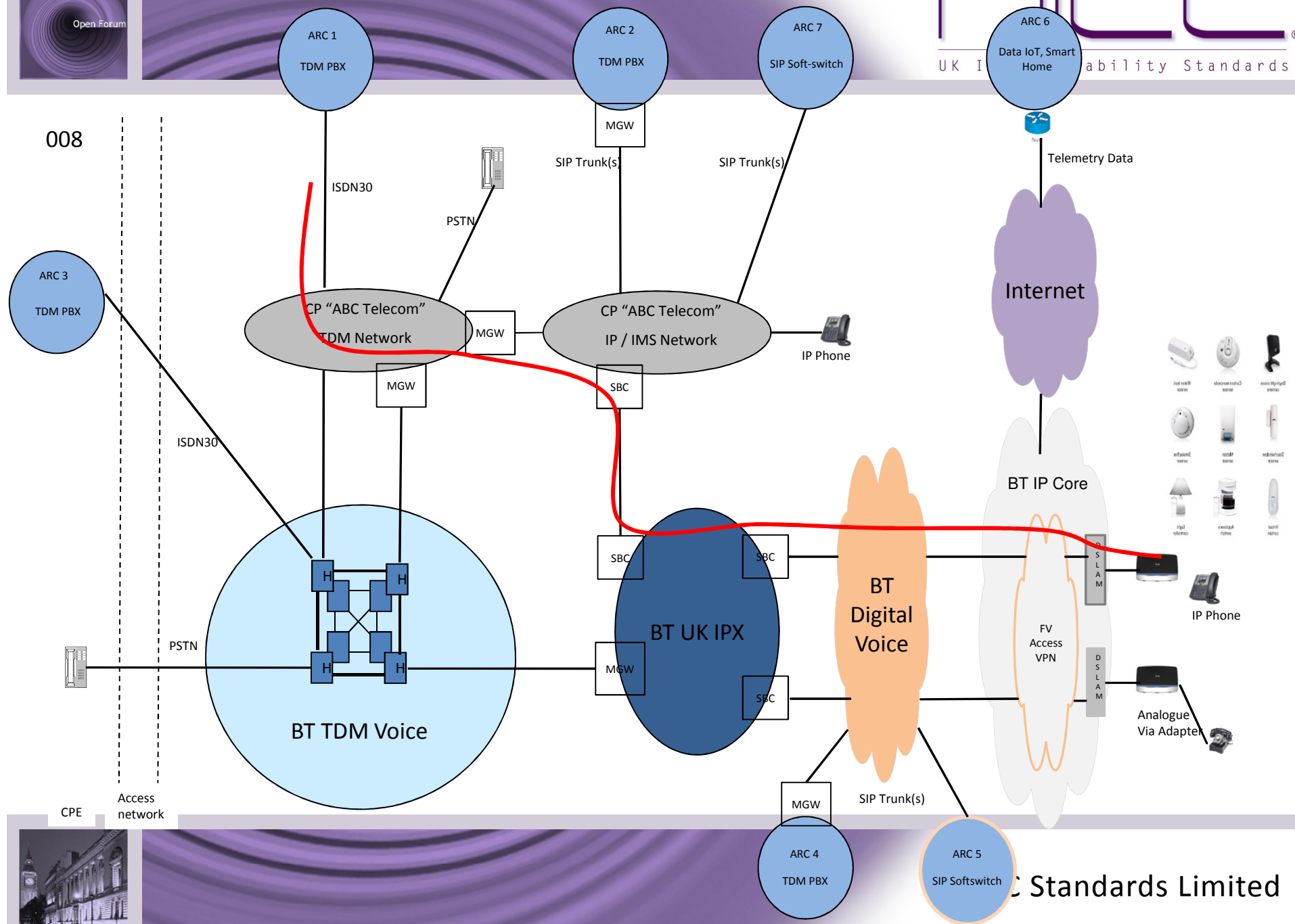
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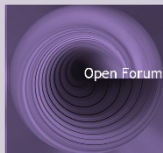
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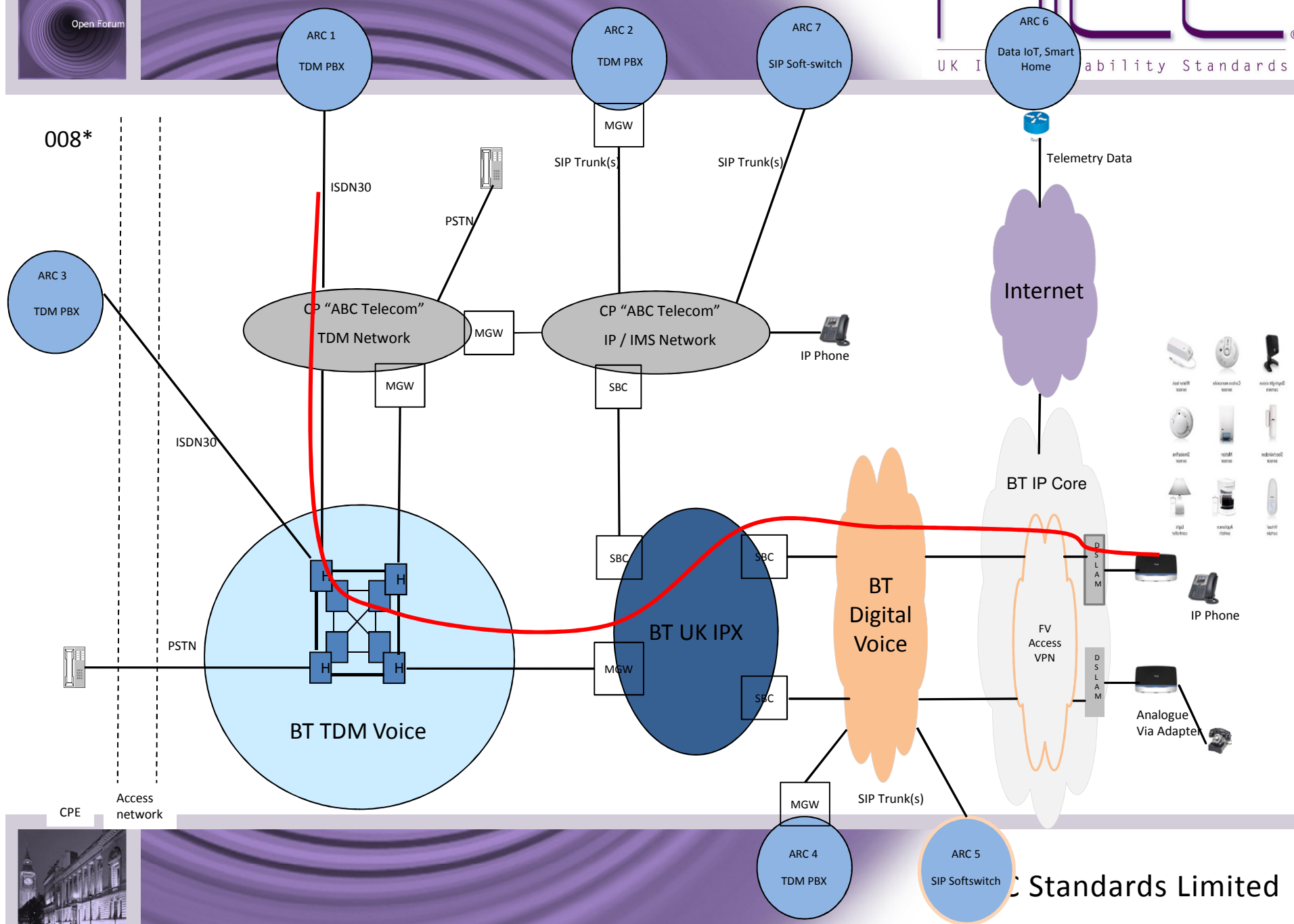


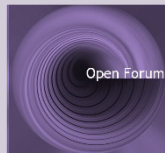
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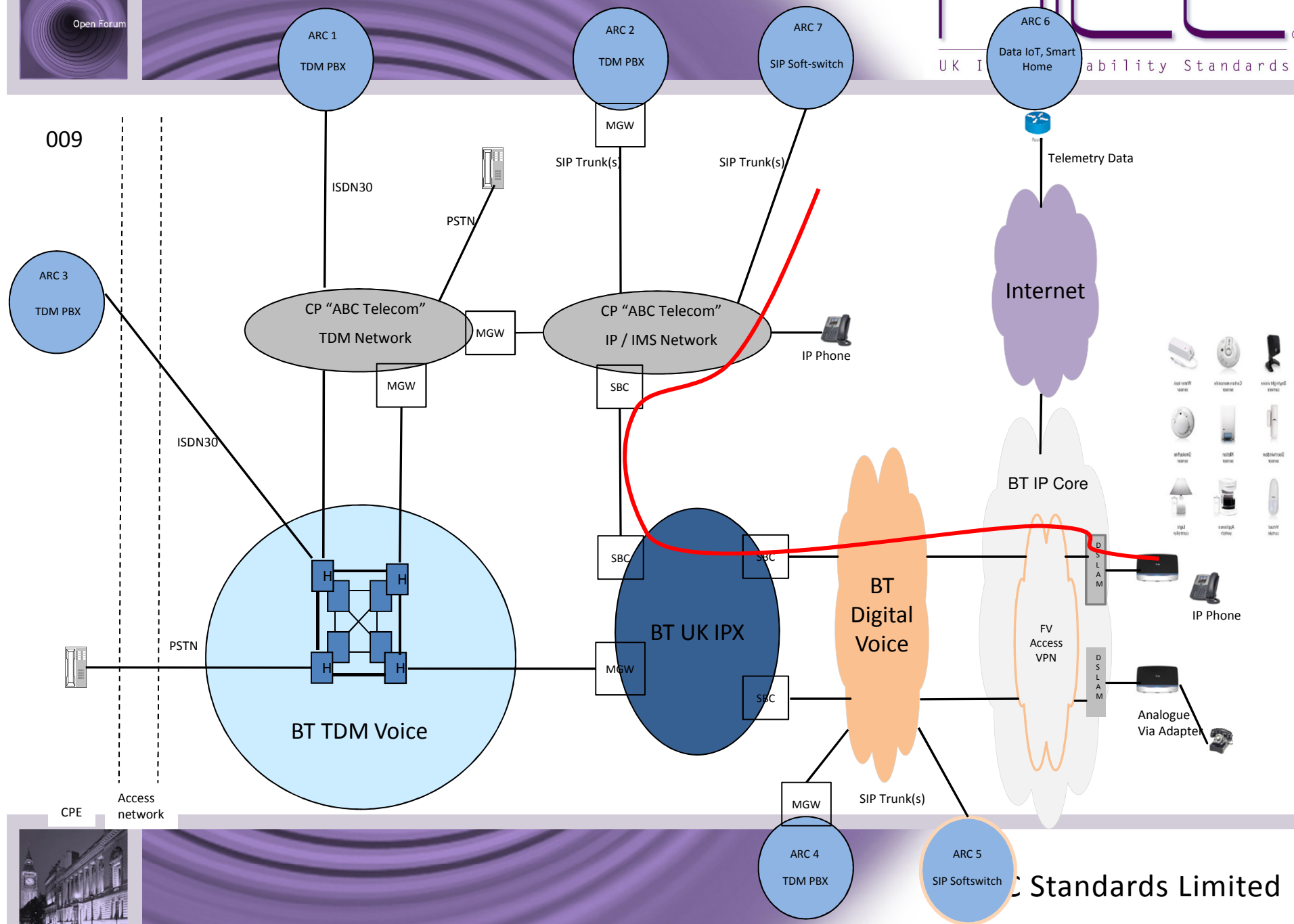
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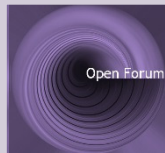




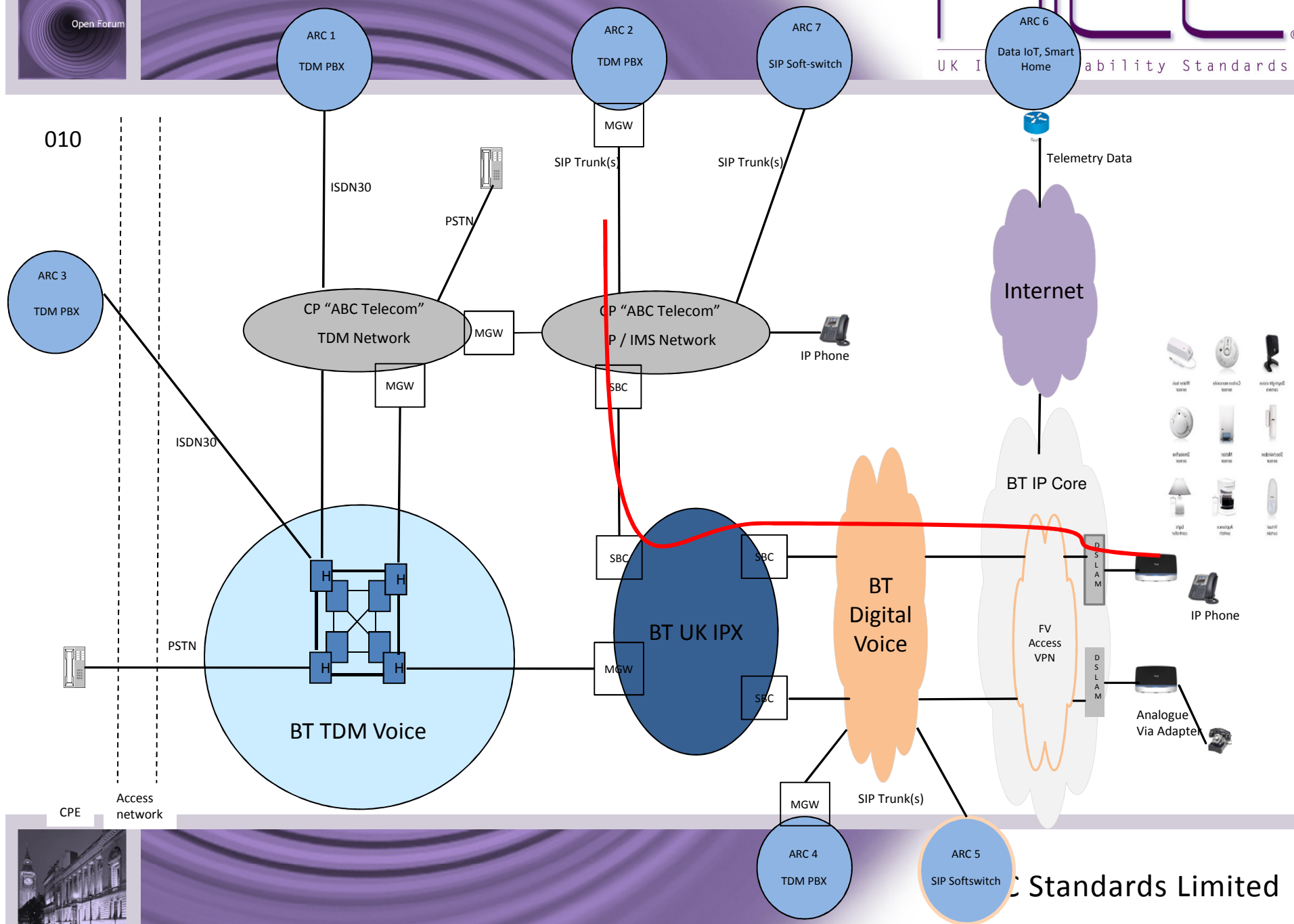
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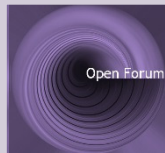
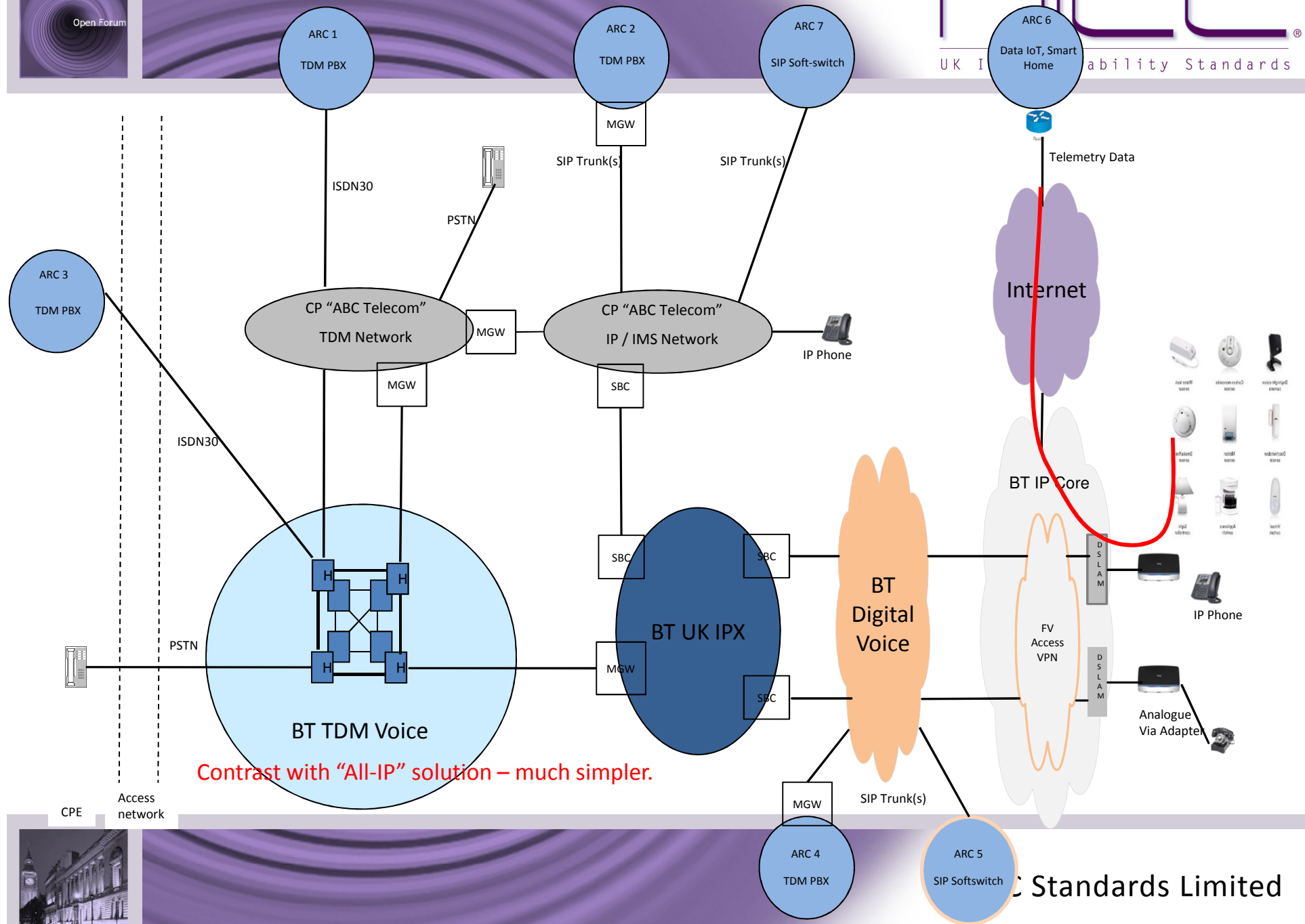
009





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Contrast with "All-IP" solution – much simpler.