Digital Transformation
The Shift from Analogue to Digital

Tim Mulrey
Associate, TSA

27 June 2019

@TSAVoice

www.tsa-voice.org.uk

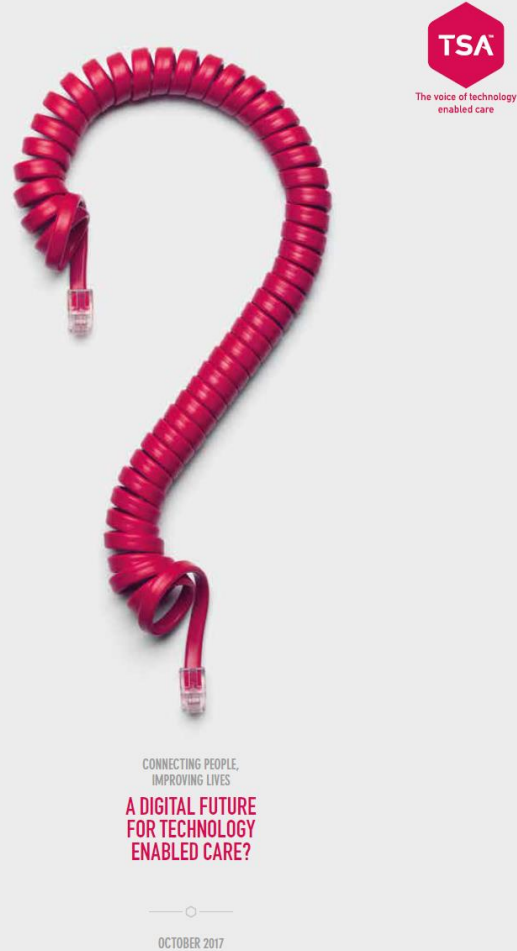Committed to Making a Difference / Inspiring Trust and Confidence / Strong Together

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TEC Quality

Standards Collaboration

Service Users

National Fire Chiefs Council

Regulators CI, CQC, RQIA, CIW

Ofcom

TEC Quality
Quality · Safety · Innovation

Association of Ambulance Chief Execs

European Standards Boards

Department of Health

British Standards

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TEC Quality

2019 Quality Standards Development

Focus of the TSA in the digital shift

CONNECTING PEOPLE,
IMPROVING LIVES

**A DIGITAL FUTURE
FOR TECHNOLOGY
ENABLED CARE?**

OCTOBER 2017

- Creating events and sharing information as to how members can make best use of TECS in the delivery of their services
- Publishing guides to relevant technical standards to support stakeholders
- Developing and agreeing test specifications for TEC industry stakeholders to adhere to
- Publishing testing results to ensure openness and transparency
- Supporting individual members to a greater or lesser extent on their transition testing to All-IP

Benefits of Digital
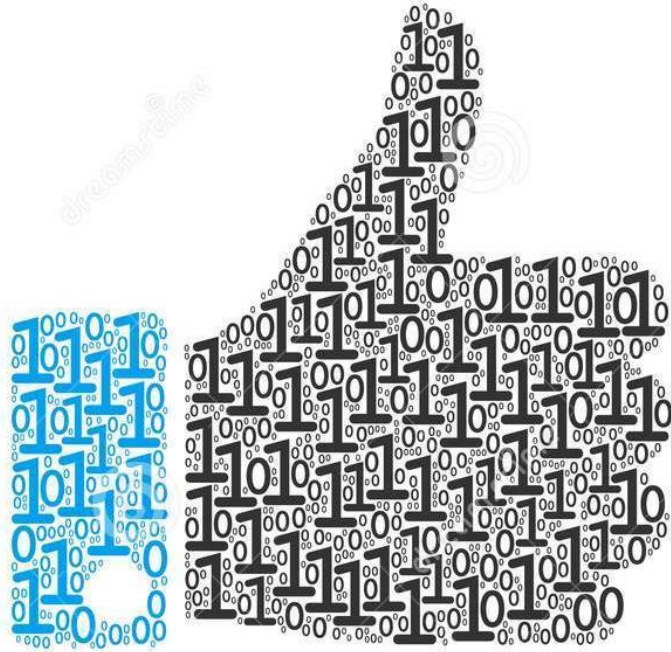
Digital alarm alerts much quicker to send

Devices are online – connected continuously

Published protocols eg SCAIP

Data rich services

Internet Protocol signalling

Barriers to take up of fixed digital alarms
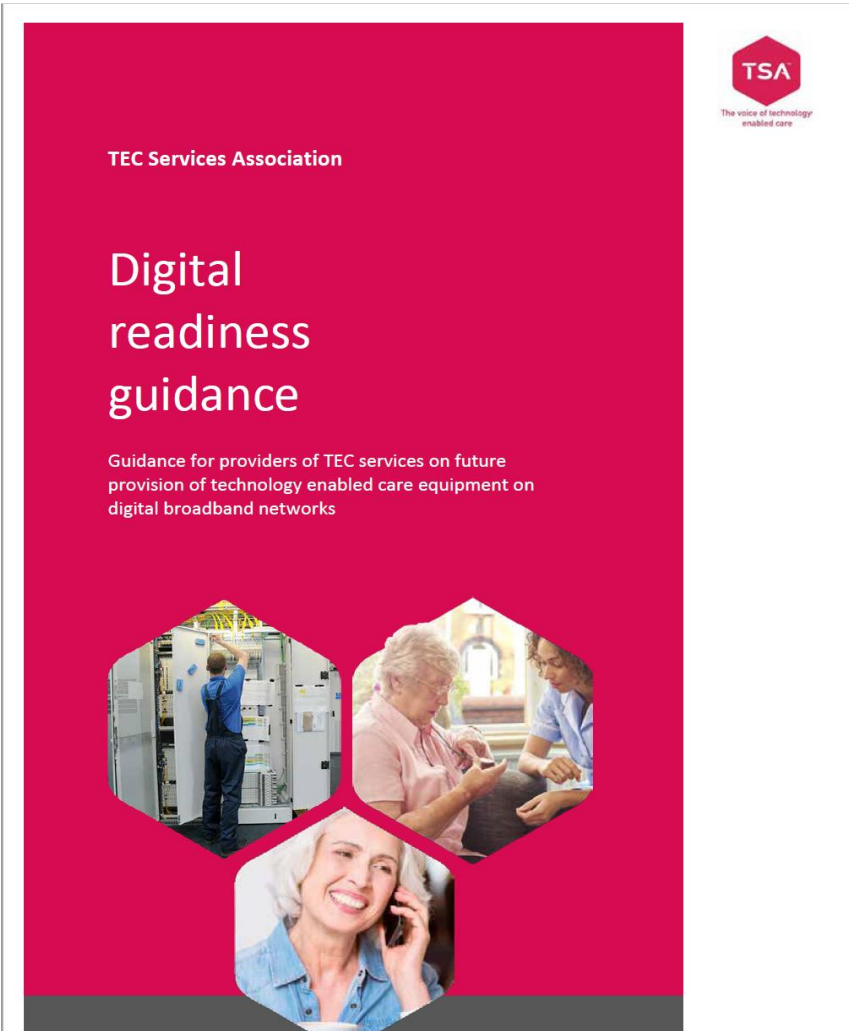
Long established analogue industry

Digital not yet required by procurement

Capital cost of wholesale device replacement

Alarm Receiving Centre capability

SIM cost

Digital Readiness Guide

Highlights:

How analogue & digital alarms work
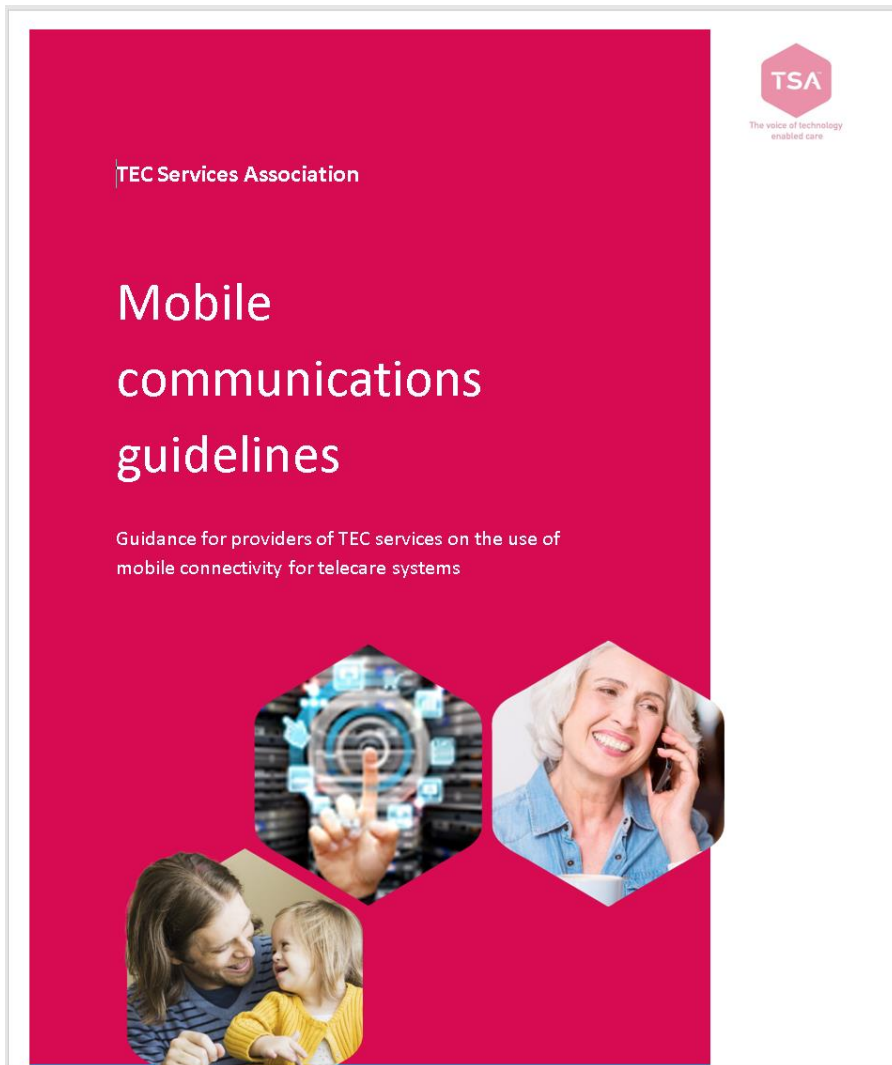
Considerations for Alarm Receiving Centres

Failover and redundancy

Installing digital alarms in the home

Glossary of terms

Mobile Readiness Guide

Highlights:

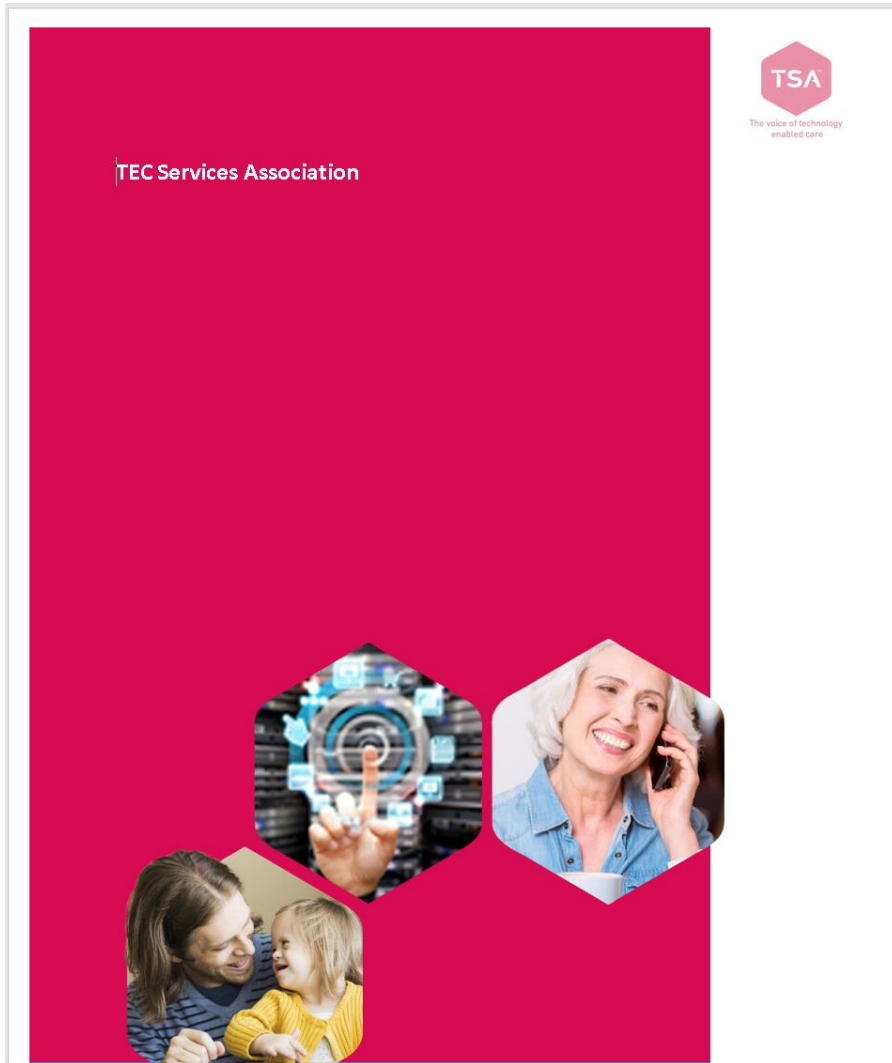**Global Roaming SIMs**

USB Dongle guidance

3G Sunset

PAYG SIMs

Data reservoir pricing

Cyber Security Guide

TSA
The voice of technology
enabled care

TEC Services Association

Highlights:

Organisational Awareness

Systems & Processes

Business Continuity

Network Security

Data Protection

Communications Providers

Managing special services during the all IP transformation

Digital Healthcare Show
Sodhi Dhillon – BT Consumer

Working closely with special services suppliers is key to a successful all IP transition

BT intends for all its customers to be using fully digital telephone services by December 2025. The first Consumer proposition will launch in the second half of 2019.

The UK is not the first country transitioning to all IP. Other global communications companies (in Germany, Japan, Sweden and other countries) are ahead of us in the process of upgrading to digital telephone services.

Special services that rely on our analogue PSTN network may be impacted by the move to all IP, and we're fully committed in working with customers and industry to make this a seamless transition.

We've been engaging with the industry for the last 18 months and are now collaborating even further with joint communication campaigns with many trade bodies and suppliers.
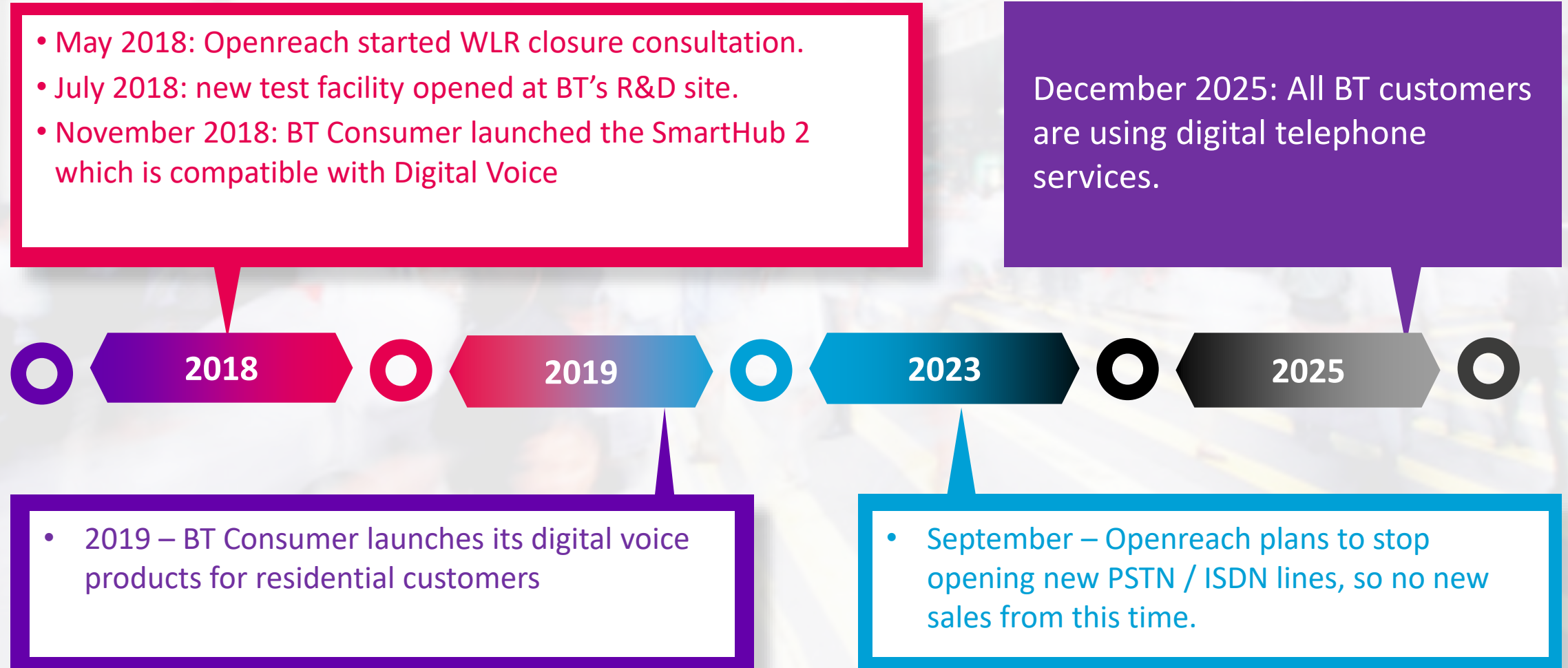
Today, we'll focus on the following 3 topics

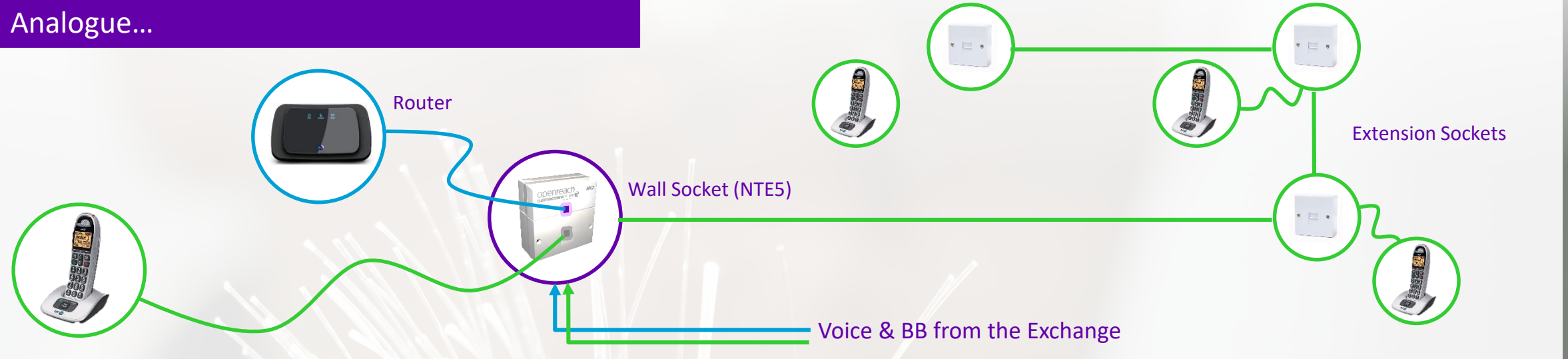| Timelines and technical impact | Testing special services equipment | Supporting customers |

BT

When?

- May 2018: Openreach started WLR closure consultation.
- July 2018: new test facility opened at BT's R&D site.
- November 2018: BT Consumer launched the SmartHub 2 which is compatible with Digital Voice

December 2025: All BT customers are using digital telephone services.

2018   **2019**   **2023**   **2025**

- 2019 – BT Consumer launches its digital voice products for residential customers

- September – Openreach plans to stop opening new PSTN / ISDN lines, so no new sales from this time.

BT

From analogue to digital: What changes in customers' homes

Analogue…

Router

Wall Socket (NTE5)

Extension Sockets

Voice & BB from the Exchange

Digital…

Router

Wall Socket (NTE5)

Extension Sockets

Voice & BB from the Exchange

BT
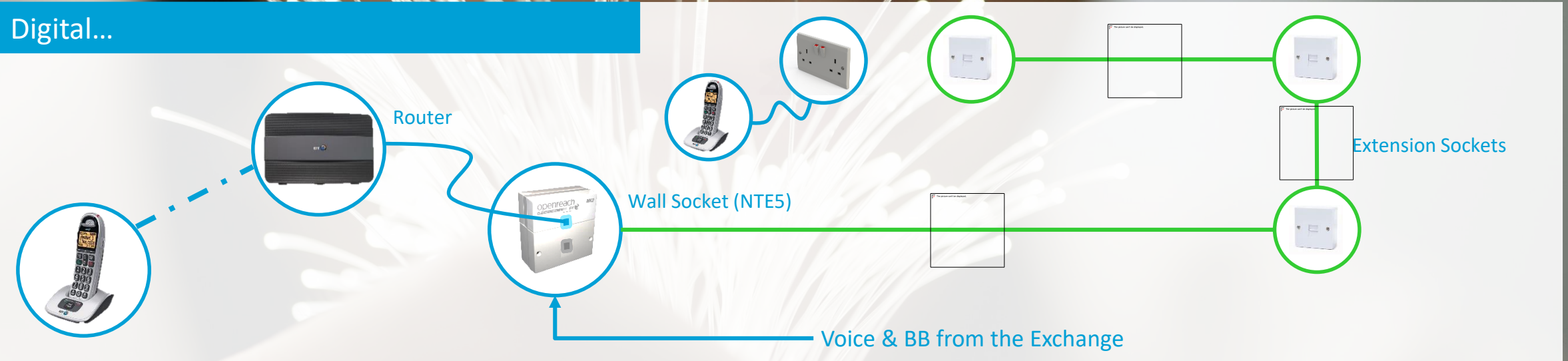
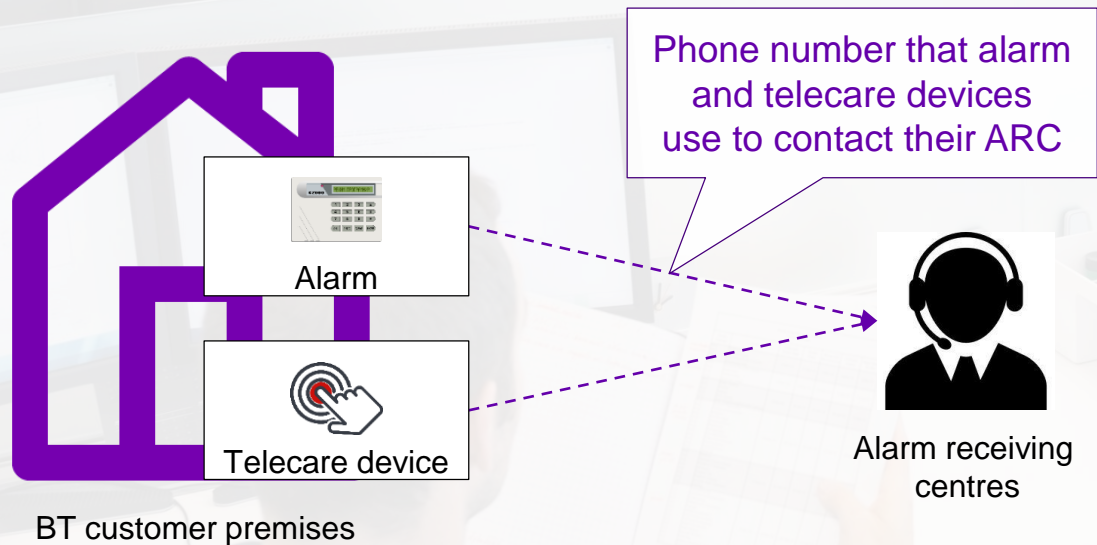# Testing Special Services Equipment in the Digital Services Lab

- Early July 2018, BT launched a test facility in Adastral Park, BT's R&D headquarters near Ipswich, for special services suppliers to come and test their equipment in BT's new all IP digital world.

- We've created an environment as close as possible to customers' premises. The lab includes:

  - All types of BT Consumer and Business lines and routers

  - Possibility to simulate different line performance levels and real world usage

- We encourage everyone to reach out to their provider and ask for test results.

BT

Identifying Customers with Special Services Equipment

Gathering numbers from monitoring centres

- In order to identify customers who uses special services devices, we're asking all receiving centres to give us the phone number their devices use to contact the control centre.

Phone number that alarm and telecare devices use to contact their ARC

Alarm

Telecare device

BT customer premises

Alarm receiving centres

Identifying customers

- We'll look for those number in our calls records to identify the customers who have dialled them in the last 12 months and will put a marker in their account.

- We don't keep track of the supplier, type of service or make/model of the special services device.

- It allows us to take extra care with those customers at the time of upgrading them onto digital voice services.

BT

Addressing the key issues of all IP

Reconnecting special services equipment

- We'll never advise our customers on how to reinstall or plug back their special services equipment after they move to Digital Voice.
- Instead we'll always tell them to contact their special services supplier for a resolution.

Battery Back Up

- In the all IP world, telephone line power no longer exists.
- We'll have a battery back up available to power the router for at least 1 hour in case of outage (free of charge for vulnerable customers)

Rapid restoration process

- On a case by case basis, customers may be reverted to PSTN in case of incompatibility of their special services equipment (only possible until PSTN is switched off)

Voice Re-Injection kit

- If using the ATA isn't suitable, customers may be offered an engineer visit to connect their wired extension to the ATA.
- It requires changing the master socket for the NTE5C model (launched in 2016)

BT

In summary

We already talked to a lot of people but still need to reach many more

- We've been engaging with key suppliers in the alarm and telecare industries and are now working jointly with some of them to reach out to the rest of the industry.
- We need your help to increase the awareness of the all IP transition in the UK.

Testing is ongoing

- Most major suppliers have tested their equipment in our lab.
- Ask your suppliers for the results of their tests with BT or encourage them to get in touch with us if they haven't been to our lab yet.

Start planning the all IP transition in your organisation

- Special services suppliers and organisations that procure such equipment must start thinking and planning about how they'll manage the transition
- We're here to support you, so please get in touch if you have any questions!

BT

For questions or lab bookings, get in touch with us

btdigitalvoice@bt.com

www.btplc.com/DigitalServicesLab

IP Voice

The Migration to Voice over IP

Safe Harbour Statement
This document contains forward looking statements and any such statements be they explicit or implicit implies no commitment on the part of Virgin Media / Liberty Global.

What is changing?

- Virgin Media, in common with other communication providers, has work underway to modernise its infrastructure and that will see a move to service delivery being over a combination of:

    - Next Generation Access (NGA)
    - Next Generation Network (NGN)

- This transformation may result in changes that alter the characteristics of telephony services which will be provided over IP (Internet Protocol).

- It is vital that those changes are understood by all.

- This briefing looks to aid that understanding by:

    - Introducing VM's network expansion programme (Project Lightning)
   - Sharing our IP Voice experience with consumers to date

The Public Switched Telephone Network (PSTN)

PSTN technology has been the basis for the provision of telephone services for decades

Its technology is now becoming outdated and equipment support from manufacturers cannot be guaranteed in the long term

If we didn't modernise, the systems would become unreliable, and would eventually not be able to be repaired

PSTN technology is also limited and will not support new and innovative services that will become increasingly relevant to modern society
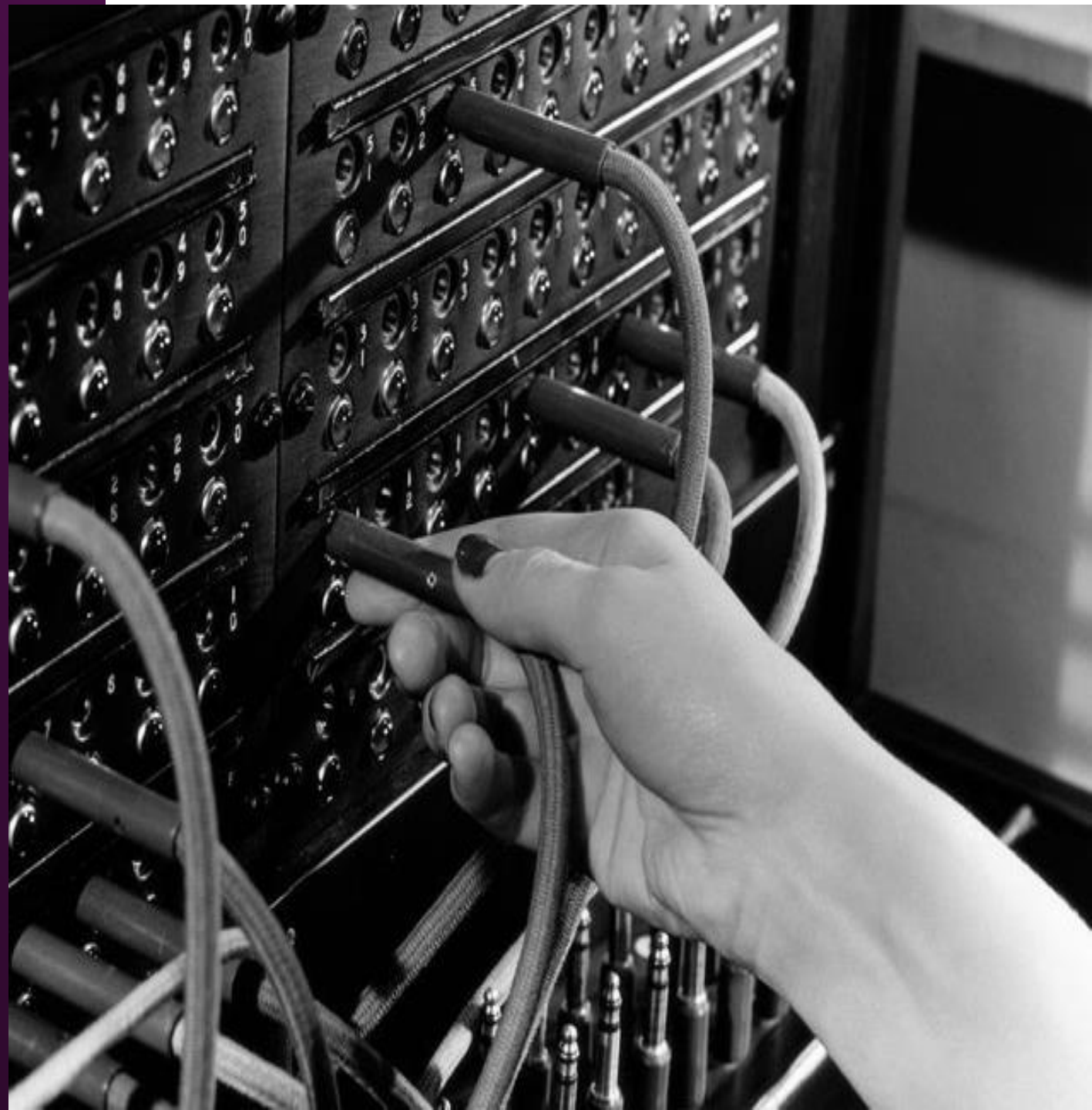
Next Generation Networks

Project Lightning is a major infrastructure project underway by Virgin Media to expand our network and significantly increase our coverage of the UK.
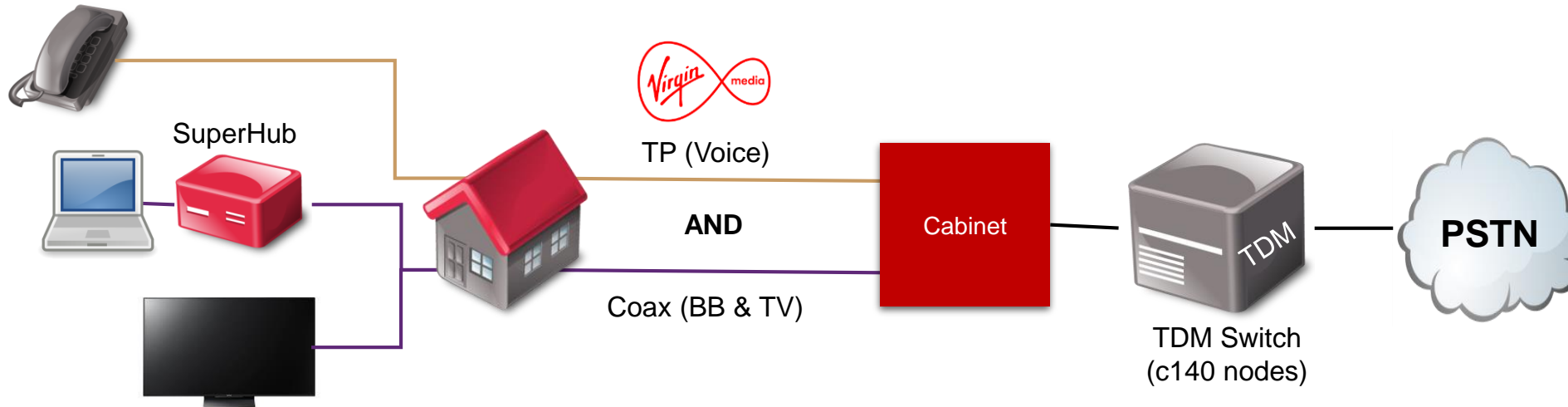
We are connecting people better than ever with some of the highest broadband speeds in the UK. The materials we use to do this are Hybrid Fibre Coax (HFC) and Fibre to the Premise (FTTP).

FTTP does not rely on the copper lines that TDM runs over, as this technology is approaching end of life and not sustainable in the medium / longer term.

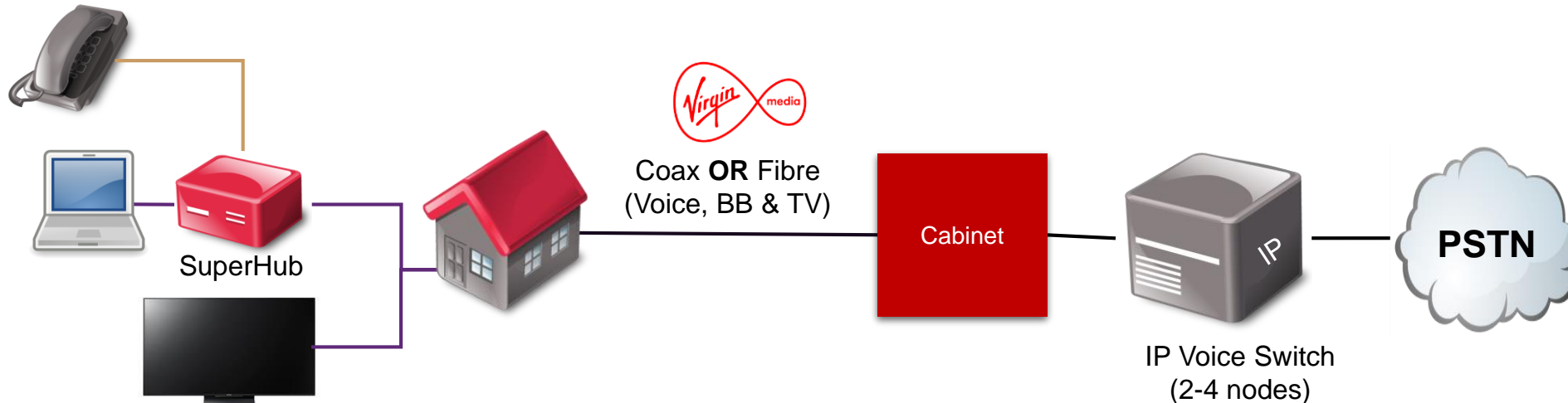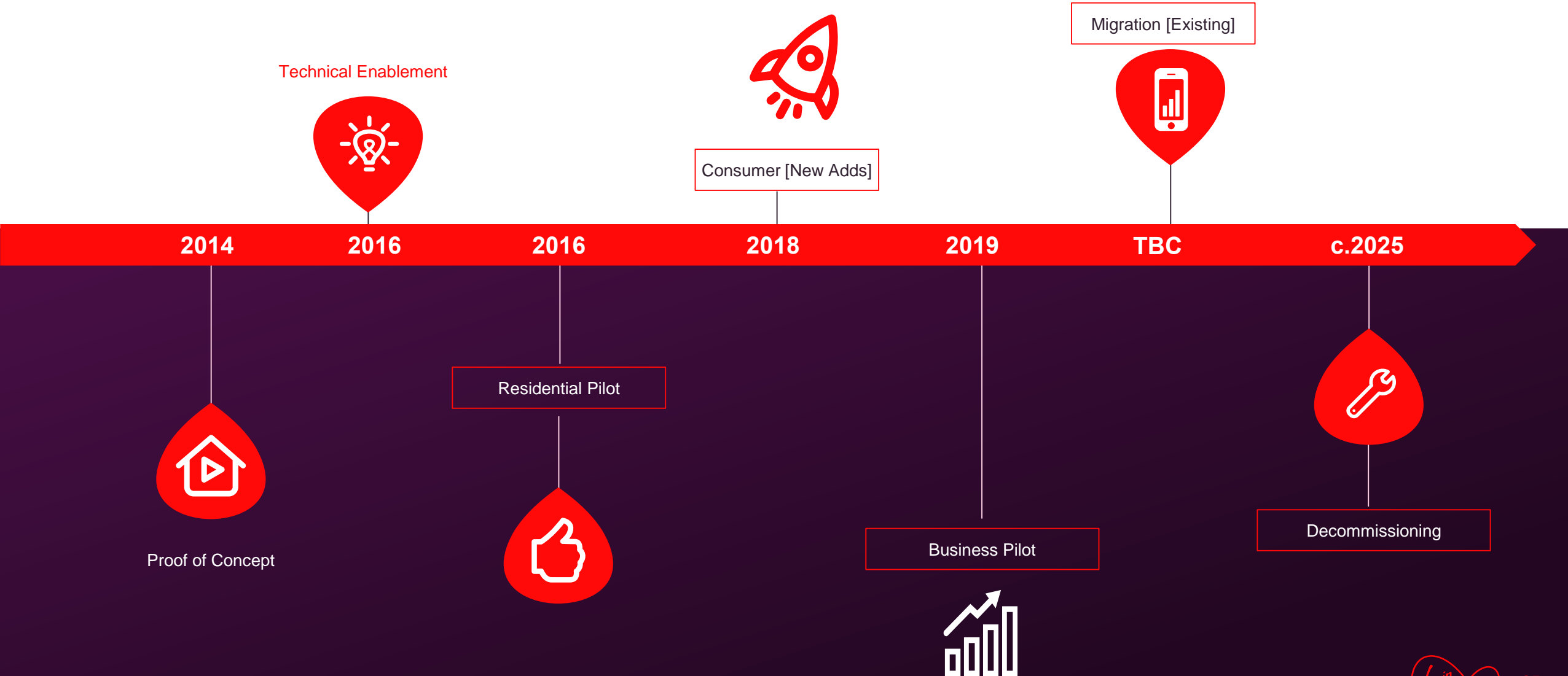# Virgin Media Voice Technology

Existing (PSTN):

TP (Voice)

AND

Coax (BB & TV)

Cabinet

TDM Switch
(c140 nodes)

PSTN

SuperHub

IP Voice :

Coax **OR** Fibre
(Voice, BB & TV)

Cabinet

IP Voice Switch
(2-4 nodes)

PSTN

SuperHub

IP Voice – Current Timeline

Technical Enablement

Migration [Existing]

Consumer [New Adds]

2014	2016	2016	2018	2019	TBC	c.2025

Residential Pilot

Proof of Concept

Business Pilot

Decommissioning

Migration Planning

- Virgin Media are planning to migrate customers from legacy telephony to IP Voice services by 2025.

- This migration will occur in different ways :

  - Provision of IP Voice service to new customers joining Virgin Media

  - Migration of individual customers in-life who contact VM

  - Migration of customers when a "switch" or area is migrated

- The first two methods could happen anywhere within Virgin Media's network area

- The final method will be geographically based

- We will trial switch migration before undertaking this activity
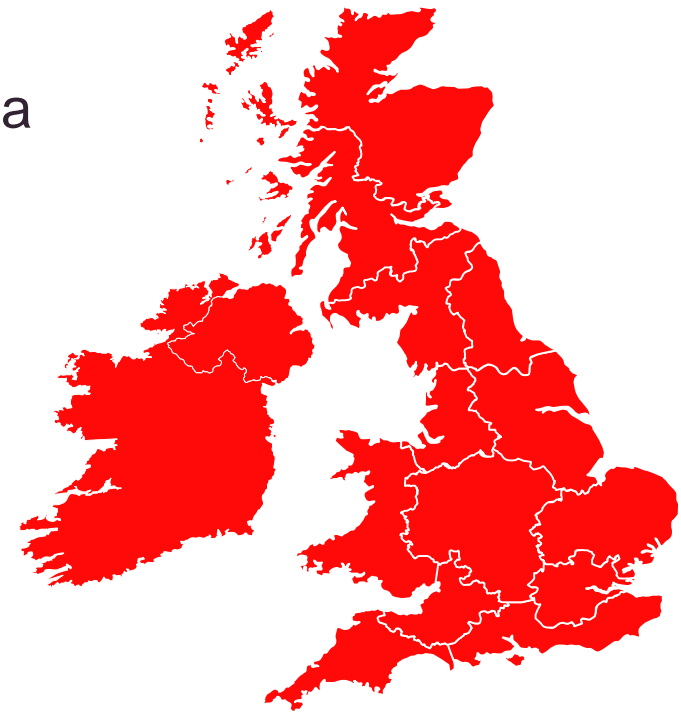
What are the challenges?

Power Outages

Telephone will not work in the event of a local power outage

Signaling Protocols

IP voice lines should support connected equipment, but some may not work

Education

We need to ensure new and existing customers are educated on the changes

Changing Needs

We need to ensure customers have a service that is fit for their needs

How are we facing those challenges?

- **Power Outages:** VM is providing an Emergency Back Up Line (EBUL) solution that uses an in-built SIM card so customers can access 999 / 112

- **Signaling Protocol:** Devices that comply to relevant standards (e.g. BS8521 and those adherent to ITU-T recommendations) should be unaffected. However, we are in dialogue with the alarm industry and stakeholders to support their understanding of the impacts of the IP switch

- **Customer Education:** We are making sure our sales channels are clear and informative, encouraging customers to check with their device provider, updating our T&Cs and user guides, working to identify vulnerable customers so we can ensure they are properly managed during migration

- **Changing Customer Needs:** We are providing the battery powered back up solution (EBUL) and we are working with Ofcom, other CPs, and alarm / telehealth industry stakeholders

What else are we doing?

Events

We have attended various alarm industry events across the UK, including in Belfast, Edinburgh, Cardiff, Manchester and London

Communications

We have been reaching out to stakeholders to update them about our IP Voice plans, e.g. ARCs, industry bodies, local authorities

Training

We are continuously assessing and updating our internal processes and training for front line and field agents to reflect our learning

Testing

We are opening a dedicated testing lab for service providers and equipment manufacturers to test compatibility with our VoIP lines

Collaboration

We are working closely with Ofcom and all impacted industries (charities, LAs, CPs) to establish good practice

Feedback from Events

- **Who is Vulnerable ?**
- **Why does a CP assess who could be vulnerable ?**
- **Does IP Voice cost more ?**
- **What if the customer does not have or want the internet ?**
- **Can you supply device quickly ?**
- **Can device call ARC numbers?**
- **Will testing be done between different networks ?**
- **When will IP roll out in my area ?**
- **Can you share customer details when they take IP Voice ?**
- **Why has Ofcom set 1hr as a battery back up time?**

Thank you!

Time for your questions

or email

IPvoice@virginmedia.co.uk

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27 June 2019

@TSAVoice

www.tsa-voice.org.uk

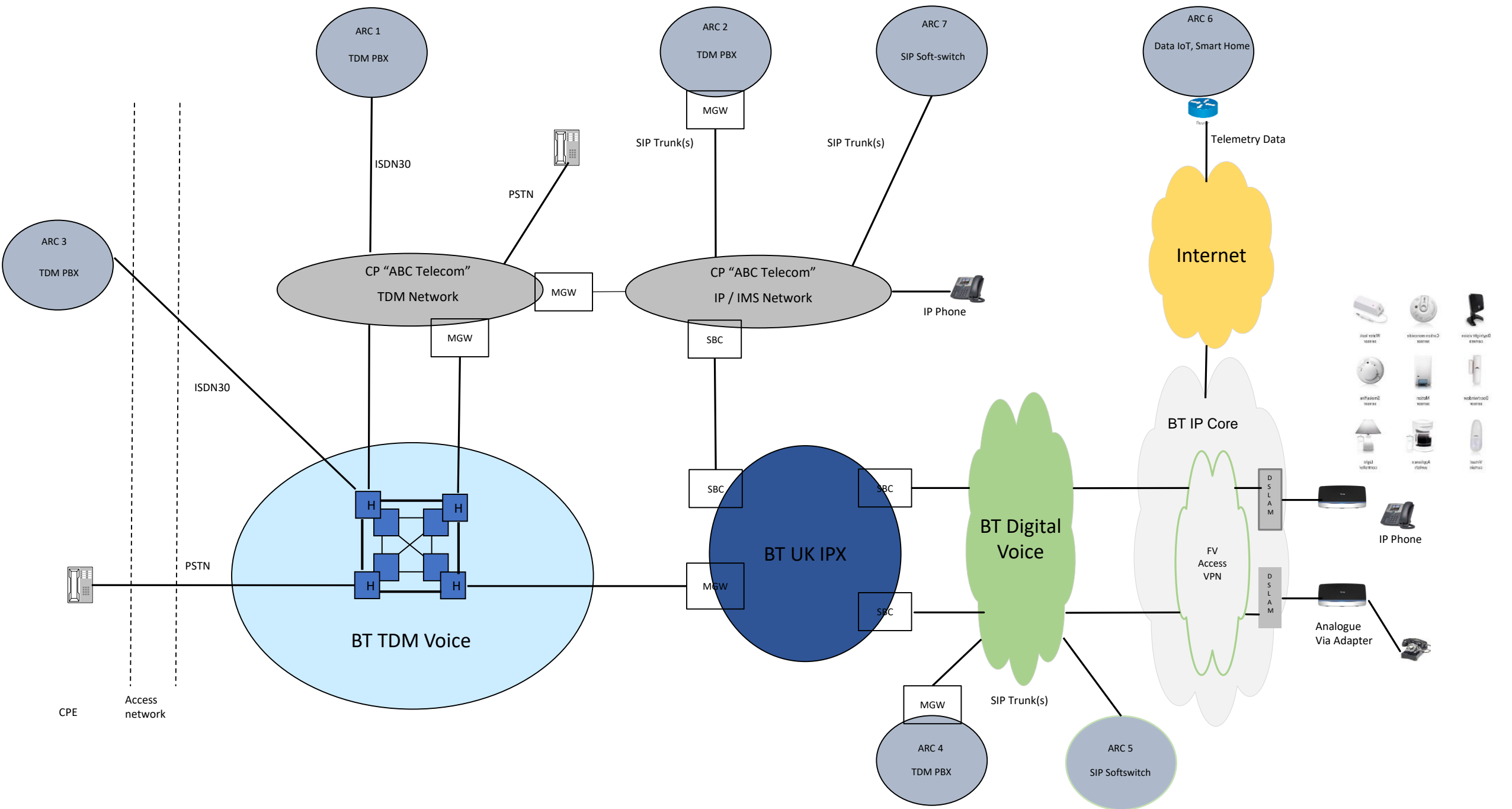Committed to Making a Difference / Inspiring Trust and Confidence / Strong Together

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ALL-IP Testing

Summary of Potential Impact of ALL-IP Networks

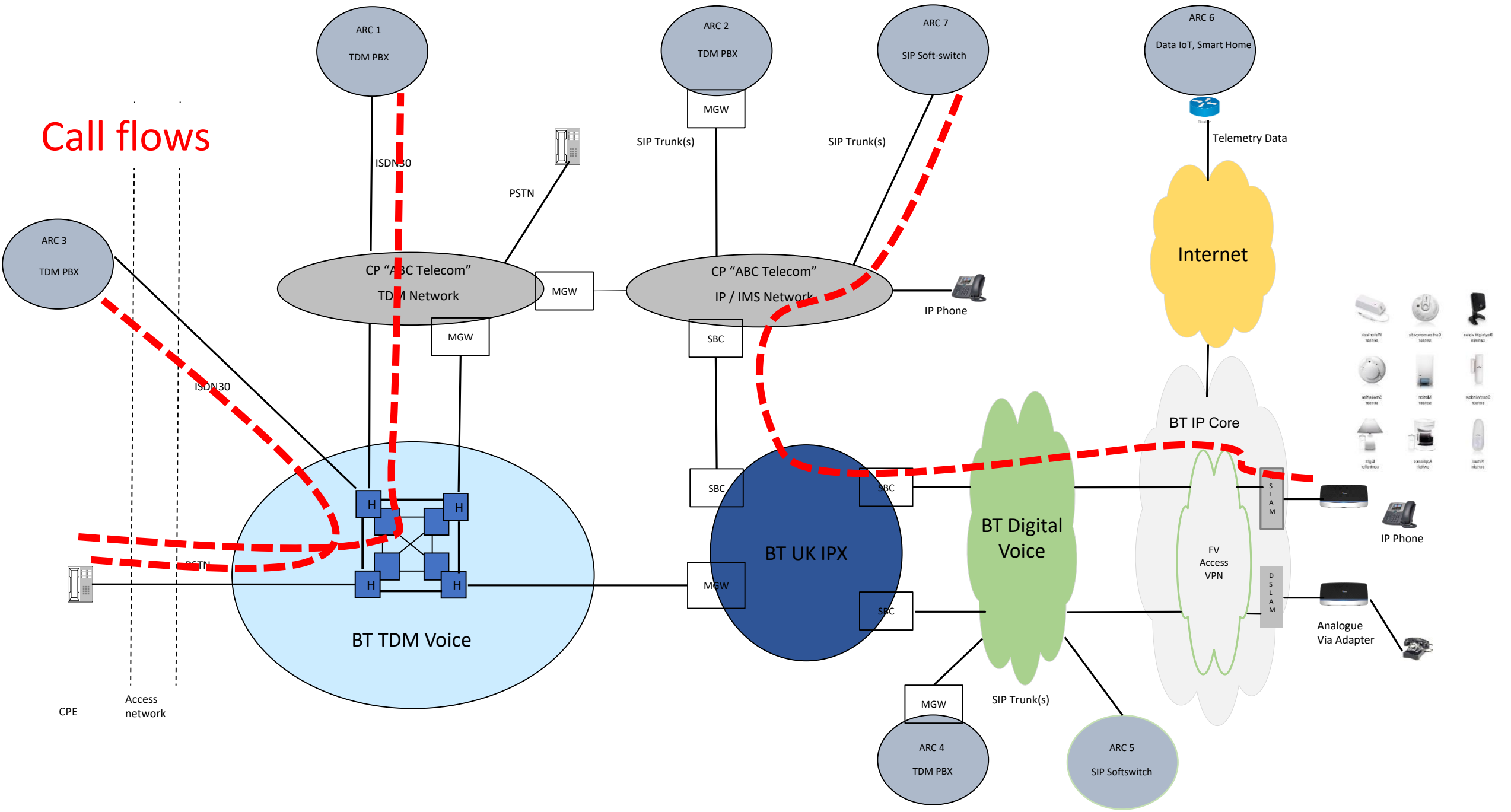Characteristics of ALL-IP that potentially affect the operation of alarms include:

- No 'line powering'
- No primary communication path in the event of local power failure
- Data discontinuities, which may occur due to:
  - dynamic jitter buffering
  - packet loss
  - interconnections between communications sub-networks
  - DTMF tone detection/re-generation
- End to end delays and synchronisation issues

Call flows

ARC 1
TDM PBX

ARC 2
TDM PBX

ARC 7
SIP Soft-switch

ARC 6
Data IoT, Smart Home

ARC 3
TDM PBX

ISDN30

MGW

SIP Trunk(s)

SIP Trunk(s)

Telemetry Data

PSTN

Internet

CP "ABC Telecom"
TDM Network

MGW

CP "ABC Telecom"
IP / IMS Network

IP Phone

ISDN30

MGW

SBC

MGW

SBC

SBC

BT IP Core

H   H

H   H

SBC

BT Digital Voice

FV Access VPN

DSLAM

IP Phone

BT TDM Voice

BT UK IPX

MGW

DSLAM

Analogue Via Adapter

PSTN

CPE

Access network

MGW

SIP Trunk(s)

ARC 4
TDM PBX

ARC 5
SIP Softswitch

Test Specification

Appendix B – Network Combination Tests

Network Combination Tests

Organisation	Date

Test Identification	Test Location

Company Representative	Independent Reviewer in Attendance

System Under Test

Alarm Receiving Centre (type/version)	Telecare Consumer Premises Equipment (manufacturer, model, unique ID)

ARC Network Connection (provider/type/configuration)	TCPE Network Connection (provider/type/configuration)

Signalling protocol (type/version)	Call Flow no.

Connecting equipment (e.g. ATA type/version)	Any special test equipment used (type/version)

Test Results

PASS/PARTIAL FAIL /FAIL

End-to-end delay (msecs)	Packet loss ratio	Test Results Test 1	Test 2	Test 3
300	0			
550	0			
1100	0			
300	1×10^{-6}			
550	1×10^{-6}			
1100	1×10^{-6}			
300	1×10^{-5}			
550	1×10^{-5}			
1100	1×10^{-5}			

Breaking point:

Comments:

Appendix C – Responses to Fault Modes

Response to Selected Fault Modes

Organisation	Date

Test Identification	Test Location

Company Representative	Independent Reviewer in Attendance

System Under Test

Alarm Receiving Centre (type/version)	Telecare Consumer Premises Equipment (manufacturer, model, unique ID)

Signalling protocol (type/version)	Communication Network (type & configuration)

Connecting equipment (e.g. ATA type/version)	Any special test equipment used (type/version)

Test Results

Circle test outcome	Alarm can be raised to an ARC?	Consumer alerted by TCPE?	Care service provider alerted?
Disconnect TCPE from ATA device	Yes / No	PASS / FAIL	Yes / No
Disconnect ATA from home gateway/router (if possible)	Yes / No	PASS / FAIL	Yes / No
Disconnect home gateway/router from wide-area network	Yes / No	PASS / FAIL	Yes / No
Mains power disconnected from home gateway/router (for 60mins)	PASS / FAIL	Yes / No	Yes / No
Mains power disconnected from home gateway/router (for 24hrs)	PASS / FAIL	Yes / No	Yes / No
Mains power disconnected from TCPE (for 60mins)	PASS / FAIL	PASS / FAIL	PASS / FAIL
Mains power disconnected from TCPE (for 24hrs)	PASS / FAIL	PASS / FAIL	PASS / FAIL
Disconnect primary ARC	PASS / FAIL	Yes / No	PASS / FAIL

Comments:

Test Specification – Packet Delay & Loss

Test Results End-to-end delay (msecs)	Packet loss ratio	PASS/PARTIAL FAIL /FAIL Test Results Test 1	Test 2	Test 3
300	0			
550	0			
1100	0			
300	1×10^{-6}			
550	1×10^{-6}			
1100	1×10^{-6}			
300	1×10^{-5}			
550	1×10^{-5}			
1100	1×10^{-5}			

Breaking point:

Comments:

Test Specification – Fault Response

Test Results		
Circle test outcome	**Alarm can be raised to an ARC?**	**Consumer alerted by TCPE?**
Disconnect TCPE from ATA device	Yes / No	PASS / FAIL
Disconnect ATA from home gateway/router (if possible)	Yes / No	PASS / FAIL
Disconnect home gateway/router from wide-area network	Yes / No	PASS / FAIL
Mains power disconnected from home gateway/router (for 60mins)	PASS / FAIL	Yes / No
Mains power disconnected from home gateway/router (for 24hrs)	PASS / FAIL	Yes / No
Mains power disconnected from TCPE (for 60mins)	PASS / FAIL	PASS / FAIL
Mains power disconnected from TCPE (for 24hrs)	PASS / FAIL	PASS / FAIL
Disconnect primary ARC	PASS / FAIL	Yes / No

Comments:

ALL-IP Test Guidelines: Categories of Testing

- **Baseline Tests:** end to end testing over a single communications network provider, employing selected combinations of alarm and ARC equipment and protocol types across a TDM network.

- **Network Combinations:** different combinations of paired communications providers, varying network performance characteristics, only selected combinations of alarm, ARC equipment and protocol types.

- **Alarm System Configurations:** multiple combinations of alarm and ARC equipment types, employing nominal network performance characteristics.

- **Fault identification:** communications are disconnected and the ability of the alarm system to identify faults and recover is tested.

- **Power Testing:** loss of local power is simulated, alarm system response is tested.

Test Scenarios for different 'Call Flows'

Call Flow no.	TCPE Connection	ARC Connection	Description and Variant Configuration	
001	BT/TDM	BT/TDM	Baseline network test	**Single comms provider**
002	BT/IP	BT/TDM	IP-TDM transcoding	
003	BT/IP	BT/IP	SIP (IP) end to end	
004	BT/IP	BT/IP	Media gateway transcodes to TDM at ARC	
005	BT/TDM	Virgin/TDM	TDM interconnect	
006	BT/TDM	Virgin/IP	TDM-IP transcoding, and SIP server at ARC	
007	BT/TDM	Virgin/IP	TDM-IP transcode & transcode to TDM at ARC	
008	BT/IP	Virgin/TDM	Via UK IPX or TDM interconnect	**multiple providers**
009	BT/IP	Virgin/IP	SIP (IP) end to end	
010	BT/IP	Virgin/IP	Media gateway transcodes to TDM at ARC	
011	BT/TDM	TalkTalk/TDM	TDM interconnect	
012	BT/TDM	TalkTalk /IP	TDM-IP transcoding, and SIP server at ARC	
013	BT/TDM	TalkTalk /IP	TDM-IP transcode & transcode to TDM at ARC	
014	BT/IP	TalkTalk /TDM	Via UK IPX or TDM interconnect	
015	BT/IP	TalkTalk /IP	SIP (IP) end to end	
016	BT/IP	TalkTalk /IP	Media gateway transcodes to TDM at ARC	
Etc	Repeated for each major Communications Provider combination			

Alarm Receiving Centres (ARCs)

- ARCs monitor vulnerable clients using hubs and peripherals via predominately landline technology

- There are over 200 ARC s in the UK

- ARCs deal with a total of 1.7 million clients

- Alarms are typically raised for falls, smoke alarms, door exit contacts etc...

- ARC receives a landline call from the property triggered by the emergency

- Landline call contains the audible DTMF tones which identify the type of incident to the contact centre as well as the voice connection to speak to the client

- The ARC operator will then deal with the emergency as appropriate

Extract from TAG Terms of Reference

ARC Incident – March 2019

- ARC operators began to receive emergency calls which carried DTMF tone but no voice connection

- Operators were unable to dial back as the alarm equipment was constantly re-dialing the ARC number

- This issue multiple clients

- These failed emergency calls were classified as no response and the individual impact was as follows:

Failed Smoke Alarm Alerts

- There were two smoke alarm alerts raised for this cohort of clients
- On both occasions the operator was unable to provide any guidance to the client as to how to exist the property as per normal procedures
- Fire Services was called to both incidents – both incidents were identified as not requiring fire services

Door Exit Alert

- One door exit alert was triggered during this period
- The door exit trigger was in place for a client with dementia who was known for wandering
- The operator was unable to provide reassurance to the client and to assist them with returning to the property
- Quick thinking on the operators part led them to notify a neighbour who was able to help the client return to their property

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Fall Alarm

- Fall alarm emergency received with no voice connection possible
- Lady had fallen and was in extreme pain with a broken hip but was only able to trigger the fall alarm
- She did not receive any reassurance that her emergency call had got through to the ARC and she did not know if anyone was coming to help her
- An ambulance did eventually arrive but her confidence in the system has been lost

TSA

Analysis

- The communication provider was utilising lower cost routing where possible
- The dialled number was not on a protected dialled number list
- Multiple hops on the core network degraded the standard of the call to the point at which the emergency calls were not being transmitted across the network correctly
- The dialled number has now been added to the protected list but how can this be prevented in the future for all 200+ ARC with multiple dialled numbers?

Summary

- Learn from events and network with other organisations with similar challenges to yourselves
- Provide relevant information to ALLIP@tsa-voice.org.uk

  - CPE Equipment / Dialled Numbers
  - ARC Hardware / Software / Network / Number / Type

- Consider an alternative to like for like replacement

  - Richer datasets
  - Predictive Analysis
  - A more digitally aware aging population

- Seek engagement from the highest levels in your organisations
- Use TSA guidance and support

Q&A