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New Sites Fibre Lift Lines Trial
Case Study

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28 January 2022

Galliard Homes

the cloud network

KONE

Contents

1.0 Executive Summary

Further to the briefing published by the Openreach New Sites organisation on 15 November 2021 announcing that any site contracting with us for FTTP will no longer be offered additional Copper for the sole purpose of service lines, this paper has been compiled to share specific technical guidance on enhancing lift lines.

In 2019 the Lift and Escalator Industry Association (LEIA) published a briefing highlighting that the switchover from traditional copper telephone lines to fibre lines using voice over internet protocol (VOIP) has the potential to seriously disrupt the operation of lift alarms connected to the Public Switch Telephone Network ("land lines") - along with guidance on potential measures to overcome the impacts of the UKs migration to a full fibre network.

(Lift-Owner-News-Planned-Upgrading-of-Telecom-networks.pdf (leia.co.uk), November 2019)

A common key requirement for Copper is the emergency telephone line for lifts and owing to the national evolution to a full fibre network leading to the subsequent Copper switch off, Openreach has been working collaboratively with KONE, one of the global leaders in the lift and escalator industry, Developer – Galliard Homes and Communications Provider – The Cloud Network to conduct the UKs first live publicised trial of connecting a fibre circuit to serve a Lift.

The purpose of the trial has been to test a working lift line over FTTP for both a digital and analogue lift application, to demonstrate fibre lift line connectivity solutions to replace traditional Copper lift lines.

This paper predominantly encapsulates the details of the FTTP trial for an analogue lift application that successfully concluded on 12 November 2021, the live trial for the digital lift application is ongoing and expected to conclude in early 2022 although KONE have already successfully completed Digital lift trials in their test environments and are therefore confident that they have a working solution in place.

The objectives of the analogue lift trial were to:

1. Identify a secure accessible location to house both the Openreach and CP apparatus.
2. Connect the analogue lift to a digital fibre telecommunications network circuit.
3. Trigger the lift alarm to automatically dial and initiate 2-way communication using the lift Speaker and verify the lifts unique identification details and location with the KONE Emergency Rescue Call Centre (Voice Over Internet Protocol - VoIP).
4. To test objectives 1 to 3 (above) in a simulated full power outage scenario.
5. Connect to the KONE lift remotely, initiate configuration commands via DTMF tones and Initiate a remote download of information from the KONE lift.

The above objectives were successfully met, and the trial therefore deemed a success, admittedly KONE encountered some issues with their lift and/or software but are confident that a solution will be achieved. In addition, the Cloud

Network tested and demonstrated the typical 12 tones i.e., 1 to 9, 0, * and # that were successfully recognised by another online DTMF test platform.

The purpose of the analogue lift trial was to support the existing legacy analogue-based lift estate, any new lifts provided by KONE are Digital and will therefore naturally work with fibre without the need for any signal conversions (as long as they are of a native IP implementation i.e. do not use DTMF signaling tones)

In addition, KONE have existing upgrade solutions in place for their analogue lifts, 1. Upgrade to GSM based connectivity or 2. Upgrading the existing analogue lift equipment to a digital platform ensuring that existing analogue lift owners are not left stranded in a full fibre world. We understand that other analogue vendors also have similar solutions in place.

This trial has successfully demonstrated that by using an ATA adaptor to convert digital signals to analogue signals existing analogue equipment can operate adequately, although this may require some configuration and/or potential software changes by the analogue equipment vendors.

To ensure business continuity we strongly recommend that Developers immediately engage with their analogue vendors to ensure that solutions are in place for their existing analogue equipment. Vendors, industry supplier and CPs are welcome to spend time in our test laboratories and this can be achieved by contacting the Openreach All-IP team for support - All-ip@openreach.co.uk.

To prevent future challenges - for any new Developments we recommend that Developers ensure that only Digital equipment is procured from their vendors as analogue is Copper based and will gradually disappear over the foreseeable future as the country rapidly moves towards a full fibre digital telecommunications infrastructure.

2.0 Service Lines Summary

Some service lines use equipment which still relies on traditional analogue signal and/or the DC voltage carried over the Copper network. Openreach has been engaged with industry over the past few years to ensure that Communication/Service Providers (CPs) and the suppliers in these industries are prepared to move to an All-IP network. There are plenty of support resources for industry available on the Openreach website – Click here to view these resources.

The Openreach network ends at the Optical Network Termination (ONT), any service line solution that connects to the Openreach network is the responsibility of the CP and the supplier of any equipment to solution. Openreach is unable to provide network solutions beyond our ONT, or to configure any customer equipment, but any CP or industry supplier can reach out to the Openreach All-IP team for support here - All-ip@openreach.co.uk

Another consideration will need to be local power contingency. Two years ago, OFCOM mandated that any local power backup for special lines should move to the CP to provide. Local power backup means the service line will continue to work, for a period of time, in the event of a power outage. Traditional Copper networks provide a DC voltage from the exchange which has its own power contingency, hence this has been one of the key industry concerns with moving to an All-IP network. Following the OFCOM decision, Openreach stopped providing Battery Backup Units (BBUs) to all its FTTP installs. It is now down to the CP to provide a local Universal Power Supply (UPS) which will need to provide power contingency for both the CP equipment (router/switch) and the Openreach ONT.

3.0 Openreach New Sites Fibre Lift Lines Trial

3.1 Trial Overview, Approach & Objectives

A common key requirement for Copper is the emergency telephone line for lifts and owing to the national evolution to a full fibre network leading to the subsequent Copper switch off, Openreach has been working collaboratively with KONE, one of the global leaders in the lift and escalator industry, Developer – Galliard Homes and Communications Provider – The Cloud Network to conduct the UKs first publicised live trial of connecting a fibre circuit to serve a Lift.

The purpose of the trial has been to test a working lift line over FTTP for both a digital and analogue lift application, to demonstrate Fibre lift line connectivity solutions to replace traditional Copper lift lines.

Note: This paper solely focuses on the FTTP trial for an analogue lift application that successfully concluded on 12 November 2021, the trial for the digital lift application in a live environment at another Galliard Homes site is ongoing and expected to conclude in early 2022 although KONE have already successfully completed Digital lift trials in their test environments and are therefore confident that they have a working solution in place. Based on the complex nature of converting a Digital to Analogue signal for the Analogue Lift, the Digital Lift Trial is anticipated to be straightforward.

The objectives of the analogue lift trial were to successfully:

Objective 1. Identify a secure accessible location to house both the Openreach and CP apparatus.

Objective 2. Connect the analogue lift to a digital fibre telecommunications network circuit.

Objective 3. Trigger the lift alarm to automatically dial and initiate 2-way communication using the lift Speaker and verify the lifts unique identification details and location with the KONE Emergency Rescue Call Centre (Voice Over Internet Protocol - VoIP).

Objective 4. To test objectives 1 to 3 (above) in a simulated full power outage scenario.

Objective 5. Connect to the KONE lift remotely, initiate configuration commands via DTMF tones and Initiate a remote download of information from the KONE lift.

3.2 Trial Objectives Summaries & Outcomes

This section covers a detailed summary of each of the 8 trial objectives listed in the previous section focusing on what actions were taken and the outcome of each.

3.2.1 Objective 1. Identify a secure accessible location to house both the Openreach and CP apparatus.

Standard Lifts include an emergency support facility to safeguard any individual that may become stranded in a lift, alerting the Lift Manufacturers emergency call centre to provide urgent support and rescue. This facility is dependent on the communications line serving the lift, a safe location is therefore required to prevent access to the Openreach and CP apparatus ensuring that unauthorised 3rd parties cannot tamper with the equipment connecting the lift to the communications line.

In this trial it was agreed that the Openreach and CP equipment would be situated in a lockable riser cupboard with keys being securely stored by the on-site concierge team. (See illustration 1.)

Illustration 1. Galliard Homes secure riser cupboard installation.

Further consideration of an additional lockable enclosure was reviewed to provide a more secure and aesthetically pleasing setup although it was agreed that for the purposes of this trial this would be not required but pursued by Galliard Homes in future delivery scenarios. Any such enclosure would need to meet the minimum requirements of the Openreach ONT specification e.g. ambient temperature within the enclosure.

In addition, the equipment location should be easily accessible enabling equipment providers to access their equipment in the event of failure or maintenance requirements.

3.2.2 Objective 2. Connect the analogue lift to a digital fibre telecommunications network circuit.

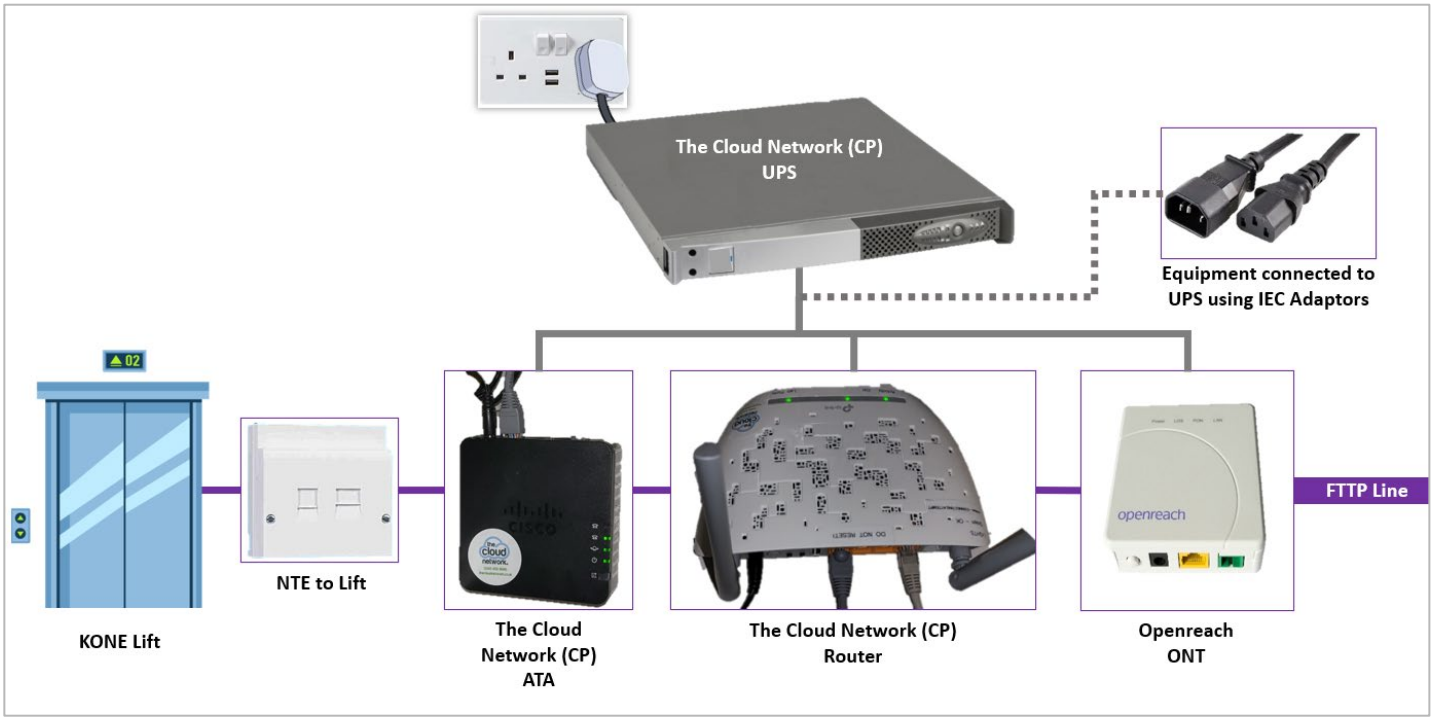
Analogue lifts operate on traditional analogue Copper line signal and FTTP lines use a digital signal. An Analogue Telephone Adaptor (ATA) is therefore required to convert the digital fibre line signal to an analogue signal. An ATA is a device for connecting traditional analog telephones and similar customer-premises devices to a digital telephone system or a voice over IP (VoIP) telephony network. Either an ATA that is built into the CP Router or a standalone ATA can be used. It should be noted that the ATA should support all 16 DTMF Tones although this can vary dependent on a vendor's software and or configuration of their equipment i.e. several may only use the traditional 12 DTMF tones - explained further in section 2.2.7.

For the purposes of this trial the external Cisco 192 ATA was used owing to 1. Other routers with built in ATA posing CP licensing challenges and 2. Capability of the ATA to support all 16 DTMF Tones.

Openreach successfully delivered an FTTP circuit and fitted the ONT to the Galliard Homes trial site, Galliard Homes then placed an FTTP order with their CP (The Cloud Network) who provided the FTTP service. The CP then connected their router to the Openreach ONT and supplied an ATA to connect from their router to the lift equipment.

The CP router and tests verified a fully functioning FTTP circuit. In addition, The Cloud Network (CP) provided an Eaton 5P1550IR Uninterrupted Power Supply (UPS) and IEC Adaptor Cable to support continued power to both the Openreach and their equipment for a period of 2 hours in a power outage scenario. (See illustration 2.)

Illustration 2. Openreach and The Cloud Network (CP) equipment FTTP connectivity map.



3.2.3 Objective 3: Trigger the lift alarm to automatically dial and initiate 2-way communication using the lift Speaker and verify the lifts unique identification details and location with the KONE Emergency Rescue Call Centre (Voice Over Internet Protocol - VoIP).

In compliance with The Lifts Regulations 2016 – Schedule 1 Essential Health and Safety Requirements: Cars must be fitted with two-way means of communication allowing permanent contact with a rescue service.

(Source: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1033496/Guide-to-lifts-regulations-2016-version-2.pdf, 2016)

In 2019 the Lift and Escalator Industry Association (LEIA) published a briefing highlighting that the switchover from traditional copper telephone lines to fibre lines using voice over internet protocol (VOIP) has the potential to seriously disrupt the operation of lift alarms connected to the Public Switch Telephone Network ("land lines") - along with guidance on potential measures to overcome the impacts of the UKs migration to a full fibre network.

(Lift-Owner-News-Planned-Upgrading-of-Telecom-networks.pdf (leia.co.uk), November 2019)

Like all lift manufacturers and aligned to regulation, KONE lifts have a built-in lift alarm button and speaker that connects to an auto-dialer to initiate communication with their Emergency Rescue Call Centre in the event of an individual becoming trapped in a lift.

The KONE lift alarm was pressed and autodialed the KONE Emergency Call Centre, and we were able to communicate clearly with the KONE representative over the speaker built into the lift. In addition, the KONE representative was able to confirm the lift serial number and the lift location successfully meeting the objectives of this test over an FTTP line. This test was conducted several times verifying repeat success of 2-way communication via VoIP based technology. It should be noted that the KONE Remote Monitoring (KRM) system was programmed with a programmed profile in place over GSM prior to the trial over fibre - see section 2.2.5 for more information surrounding remote programming.

3.2.4 Objective 4: To test objectives 1 to 3 (above) in a simulated full power outage scenario.

Calls made over broadband using VoIP-based technology will not function in a power cut, as the broadband equipment at the premises requires mains power to work. As a result, calls will only be possible if additional protection measures are put in place.

Following public consultation in October 2018 Ofcom regulated that Communication Providers must meet the obligation to ensure uninterrupted access to emergency organisations during a power outage for those customers using VoIP technology. Providers should have at least one solution available that enables access to emergency organisations for a minimum of one hour in the event of a power outage in the premises.

(Source: https://www.ofcom.org.uk/__data/assets/pdf_file/0016/123118/guidance-emergency-access-power-cut.pdf, October 2018)

In addition, The Lifts Regulations 2016 – Schedule 1 Essential Health and Safety Requirements states that the means of two-way means of communication allowing permanent contact with a rescue service must be designed and constructed so as to function even without the normal power supply. Their period of operation should be long enough to allow normal operation of the rescue procedure.

(Source: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1033496/Guide-to-lifts-regulations-2016-version-2.pdf, 2016)

The Cloud Network (CP) therefore provided an Eaton 5P1550IR Uninterrupted Power Supply (UPS) with IEC adaptor connections to support continued power to both the Openreach and their equipment for a period of 2 hours in a power outage scenario. (See illustration 2.)

Our trial encompassed testing objectives 1 to 3 in a simulated power outage scenario by pulling the power plug on the UPS device which continued to provide power and to the equipment without any loss of power.

3.2.5 Objective 5: Connect to the KONE lift remotely, initiate configuration commands via DTMF tones and Initiate a remote download of information from the KONE lift.

Like several lift vendors, KONE require the capability to connect to their lifts remotely to enable them to configure, update their lift equipment and download information off site.

Traditional Copper analogue lines support DTMF (Dual tone muti-frequency) signaling tones to be sent from one device to another. There are typically 12 tones that most people are aware of i.e., 1 to 9, 0, * and #, additionally there are another 4 i.e., A, B, C and D resulting in a total of 16 tones. These tones provide the protocols required to enable programming of KONE's analogue lifts remotely.

Digital Fibre lines normally only support native IP implementations and do not naturally support DTMF signaling tones.

To convert the digital fibre line signal to an analogue signal enabling DTMF signaling tones an external Cisco 192 ATA was used owing to 1. Other Routers with built in ATA posing CP licensing challenges and 2. Capability of this ATA to support all 16 DTMF Tones.

Upon initial trial we encountered issues with the KONE lift not recognising any tones, although after numerous configuration changes both within the ATA and Lift settings we were able to achieve recognition of tones 1, 4, 7, 5, 6, 9 - verified by the KONE lift responding to configuration option selections remotely. KONE encountered issues with tones 2, 3, 8, A, B, C and D not being recognised by their lift equipment resulting in challenges in reprogramming the lift remotely and are therefore scheduled to spend time in Openreach's test laboratories in London to identify a solution. KONE were able to remotely access and clear / wipe the lifts programme verifying tone responses, in addition

The Cloud Network tested and demonstrated all of the typical 12 tones i.e., 1 to 9, 0, * and # were successfully being recognised by another online test platform.

It should be noted that some issues were also encountered with the KONE remote configurations due to a reliance on SMS technology, this was however overcome by KONE making a software change to bypass SMS usage as ATAs do not support SMS technology.

4.0 Recommendations

The purpose of the analogue lift trial was to support the existing legacy analogue-based lift estate, any new lifts provided by KONE are Digital and will therefore naturally work with fibre without the need for any signal conversions, as long as any fibre solutions are based on a native IP implementation i.e. do not use DTMF tones.

The analogue lift trial has been deemed a success as the trial objectives have been achieved, admittedly KONE have encountered some issues with their lift and software but are confident that a solution will be achieved.

In addition, KONE have a couple of existing upgrade solutions in place for their analogue lifts, 1. Upgrade to GSM based connectivity or 2. Upgrading the existing analogue lift equipment to a digital platform ensuring that existing analogue lift owners are not left stranded in a full fibre world. We understand that other analogue vendors also have similar solutions in place.

This trial has successfully demonstrated that by using an ATA adaptor to convert digital signals to analogue signals existing analogue equipment can operate adequately, although this may require some configuration and/or potential software changes by the analogue equipment vendors. To ensure business continuity we strongly recommend that Developers immediately engage with their analogue vendors to ensure that solutions are in place for their existing analogue equipment. Vendors, industry supplier and CPs are welcome to spend time in our test laboratories and this can be achieved by contacting the Openreach All-IP team for support - All-ip@openreach.co.uk.

To prevent future challenges - for any new Developments we recommend that Developers ensure that only Digital devices are procured from their vendors as analogue is Copper based and will gradually disappear over the foreseeable future as the country rapidly moves towards a full fibre digital telecommunications infrastructure.

Another consideration will need to be local power contingency. Two years ago, OFCOM mandated that any local power backup for special lines should move to the CP to provide. Local power backup means the service line will continue to work, for a period of time, in the event of a power outage. Traditional Copper networks provide a DC voltage from the exchange which has its own power contingency; hence this has been one of the key industry concerns with moving to an All-IP network. Following the OFCOM decision, Openreach stopped providing Battery Backup Units (BBUs) to all its FTTP installs. It is now down to the CP to provide a local Universal Power Supply (UPS) which will need to provide power contingency for both the CP equipment (router/switch) and the Openreach ONT.