CONSULTATION PAPER ISSUED BY THE INFO-COMMUNICATIONS DEVELOPMENT AUTHORITY OF SINGAPORE

REVIEW OF INTERNAL WIRING FRAMEWORK

15 July 2014

PART I: INTRODUCTION

1. In 1996, the Info-communications Development Authority of Singapore ("**IDA**") (then the Telecommunication Authority of Singapore) put in place an Internal Wiring Framework ("**IW Framework**") to regulate and license persons who carry out internal telecommunication wiring work ("**IW Work**") within end-user premises. The IW Framework aims to safeguard end-users' welfare and protect the integrity and safety of the public telecommunications network, by requiring IW Work contractors to undergo relevant training, as well as to ensure that their wiring work complies with a minimum level of standard.

2. This IW framework comprises the following:

   (a) The Telecommunications (Internal Wiring) Regulations 2005 (the "**IW Regulations**") – which set out the overall framework governing the conduct of IW Work in Singapore; and

   (b) The Code of Practice for Internal Telecommunication Wiring (the "**IW Code**") – which sets out the technical specifications for IW Work installers/contractors to comply with when carrying out IW Work.

3. Pursuant to the IW Regulations, IDA currently issues two types of licences for the conduct of IW Work:

   (a) A **Telecommunication Wiring Installer's Licence** ("**Installer's Licence**"), issued to individuals, who must have passed a relevant course conducted by the SingTel Learning Centre or the Institute of Technical Education ("**ITE**")[1]; and

   (b) A **Telecommunication Wiring Contractor's (Class) Licence** ("**Contractor's Licence**"), issued to business organisations, which employ at least one individual with an Installer's Licence.

4. At present, IDA's IW Framework focuses on twisted-pair (category 3) cables which support the wire-based public switched telephone network ("**PSTN**"). With the deployment of new access networks, such as the optical fibre-based Nationwide Broadband Network ("**NBN**"), IDA believes that it is timely to conduct a review of the IW Framework, in particular, to assess whether the IW Framework should be restructured and revised to also focus on the three other types of telecommunication cables that are currently deployed – i.e., coaxial, structured (category 5E and above)[2] and optical fibre cables.

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[1] The list of courses is currently published by IDA in its *Guidelines to Application for Telecommunication Wiring Licences* (copy available on the IDA website at: http://www.ida.gov.sg/~/media/Files/PCDG/Licensees/Licensing/Framework%20and%20Guidelines/GuidelinesLicensingSch/GuidelinesApplicationTelecomWiringLicence.pdf).

[2] More commonly known as Local Area Network or LAN cables.

PART II: PROPOSED REVISIONS TO IDA'S INTERNAL WIRING FRAMEWORK

Proposed Revision to Scope of IW Framework

5. Today, in addition to twisted-pair cables, coaxial and optical fibre cables have been deployed substantially nationwide, reaching directly into end-users' premises. Within the end-users' premises, structured cabling has become a popular choice of internal wiring, and is one of the mandated forms of in-premises cabling to be pre-installed by owners/developers of new residential buildings under IDA's Code of Practice for Info-communication Facilities in Buildings ("**COPIF**")[3]. Given that these four types of cabling are the mainstream cabling options used for key telecommunication services such as Internet broadband and telephony, IDA proposes to restructure and revise the IW Framework by applying it to twisted-pair, coaxial, structured, and optical fibre cables.

6. The intended revisions to the IW Framework will ensure that the framework deals with all common in-building cabling media holistically. More importantly, they aim to ensure that good quality IW Work is carried out for all four commonly-used cables and end-users will have the benefit of regulatory deterrence against shoddy/defective wiring work, as IDA will be able to take appropriate measures against installers/contractors who do not comply with the IW Framework, for all four types of cables (instead of just twisted-pair cables). Moreover, given the increasing prevalence of in-home cabling (e.g., to connect multiple computers, TVs within the home) and the increasing number of different services which ride on these different cabling infrastructures, the impact of poor wiring of any of these four types of cables may be significant. The impact will be particularly serious in the case of optical fibre, as it is the main transmission medium for the NBN[4]. IDA notes that optical fibre, being made of glass, is less ductile and harder to install, maintain and repair. Hence, any poor installation/relocation of optical fibre cables could result in technical problems in connecting to and accessing services delivered over the NBN.

Question 1: IDA invites views and comments on the proposed revisions to the IW Framework in respect of its application to coaxial cables, structured cables and optical fibre cables, in addition to twisted-pair cables.

Training Courses & other Certifications for Licensing Purposes

7. To support the revised IW Framework and to ensure the quality of IW Work carried out under it, IDA proposes that only those parties who have attended and passed the relevant training courses endorsed or approved by IDA, or who possess the relevant certifications from a Public Telecommunication Licensee ("**PTL**"), as specified by IDA, may be licensed to carry out IW Work that they have been certified for. Such parties would be deemed to have the

[3] The COPIF governs the deployment of space and facilities (including telecommunications cabling for in-building units) by the developer or owner of a land or building

[4] While IDA believes that structured cables are more likely to be used as the transmission medium for extending the reach of the NBN within end-users' premises, IDA notes that end users might also want to engage wiring installers to relocate the existing installed fibre cables and the Termination Point ("TP") (e.g., for aesthetic reasons after renovation works).

necessary educational qualifications and/or sufficient experience to be licensed.

Training Courses

8. In this regard, IDA has engaged in preliminary discussions with educational institution on the development of individual training courses for IW Work for each of the four types of cables. IDA also understands that certain equipment manufacturers may already conduct their own training courses for their staff/agents or installers/contractors, particularly for the installation of structured cabling. To ensure that these various training courses mentioned above are of an adequate standard and relevant for the purposes of IDA's licensing scheme for IW Work, IDA will set up a panel (which may include representatives from the industry), to assess the courses and determine whether licences can be granted based on such training courses.

Certifications from PTLs

9. IDA also recognises that there may be installers who are already trained and certified by PTLs, and the PTLs would prefer the end-users engage these installers for IW Work so that it is compatible with the PTLs' networks. As one of the aims of the IW Framework is to ensure compatibility between internal telecommunication wiring and public telecommunication systems[5], IDA is prepared to recognise PTL-certified installers as qualified installers possessing the relevant skills to carry out IW Work under the revised IW Framework, on the condition that the PTLs:

   (a) submit their training syllabus to IDA for prior review by the panel proposed above; and

   (b) provide IDA with the necessary verification that their certified installers have gone through the necessary training in respect of all the cable types that their installers are certified for.

Question 2: IDA invites views and comments on the proposal to only license IW Work installers who have: (a) passed the relevant courses approved by IDA; or (b) possess the necessary certification from the PTLs.

Proposed Revisions to Certification Process under COPIF

10. IDA notes that the developers and owners of residential developments or buildings are required to provide coaxial cables, structured cables and optical fibre cables in each residential unit under the COPIF issued in May 2013 ("**COPIF 2013**"). In addition, such developers or owners are also required to obtain coaxial readiness certification and fibre readiness certification to ensure that the deployed coaxial cables and optical fibre cables can be used for the provision of the respective services. IDA understands that developers and owners currently approach StarHub Ltd for coaxial readiness certification and

[5] For the avoidance of doubt, certified installers are allowed to carry out other types of IW Work as well, e.g., the interconnection of one PTL's network to another network.

OpenNet Pte Ltd for fibre readiness certification as these telecommunication service providers offer services over the respective media on a nation-wide basis.

11. It is noted that once the IW Framework takes effect, only licensed installers/contractors would be able to carry out such IW Works for coaxial cable and optical fibre cables. Considering that these installers/contractors are expected to ensure that IW Work within residential units is properly carried out, it may no longer be necessary for such developers or owners to obtain further readiness certification for coaxial cables and optical fibre cables. On the other hand, while IDA could take ex-post action against licensed installers/contractors who fail to carry out IW Works for these cables properly (resulting in service delivery problems over these cables), IDA recognises that end-users will be impacted if rectification work has to be done on these cables.

12. On balance, IDA proposes to retain the requirement on developers or owners to obtain coaxial readiness certification and fibre readiness certification, for coaxial cables and optical fibre cables deployed in residential developments or buildings. IDA will monitor the situation after the introduction of the IW Framework to assess whether the above requirements should be reviewed. IDA will also work with StarHub Ltd and OpenNet Pte Ltd to increase the pool of authorised contractors that developers and owners can turn to for the respective readiness certifications for greater flexibility and choice.

Question 3: IDA seeks views and comments on the intention to retain the requirement to obtain readiness certification for coaxial cables and optical fibre cables under COPIF 2013 even if such cables have been installed by licensed installers/contractors.

Proposed Revisions to IW Work Licensing Structure

13. While IDA is proposing to revise the IW Framework and apply it to twisted-pair, coaxial, structured, and optical fibre cables, IDA is also cognisant of the need to manage the compliance costs associated with this regulatory framework. To reduce the regulatory burden imposed on IW Work installers/contractors, IDA proposes to streamline the licence structure of the IW Framework as follows:

    (a) For the Installer's licence framework (for individuals), IDA proposes to change the licensing regime, which is presently based on individual licensing, to a class licensing regime. Under the new regime, the licensing process will be simplified and individuals will be deemed class licensed as long as they: (1) register with IDA for each type of cable that they are qualified to carry out IW Work for[6]; and (2) submit their certificate(s) of the relevant course(s) for the relevant types of cable[7], or the necessary certifications from PTLs in relation to the relevant types of cable.

[6] For example, if the individual wishes to be licensed to carry out IW Work involving all four types of cables, the individual will need to register for **each** of the four types of cables. The registrations can take place at the same time or at different times.

[7] For example, if the individual wishes to carry out IW Work involving optical fibre cables, he must first pass a training course for optical fibre (which will be specified by IDA).

The registration process will be made available online and the applicants can attach their relevant certificates during the submission. The registration will also take effect immediately upon successful submission. While IDA has simplified the licensing process, IDA will ensure that quality standards are not compromised. IDA will conduct checks, with information obtained from the course providers or the PTLs (as appropriate), to confirm that the individuals have, in fact, obtained the necessary qualifications.

IDA proposes that individuals who presently hold Installer's Licences (with respect to twisted-pair cables) be deemed registered or "class-licensed" to carry out IW Work for twisted-pair cables under the new framework[8].

(b) For the Contractor's licence framework (for business organisations), IDA proposes to retain the present class licensing regime, but modify it such that organisations will need to register for each type of cable that they intend to carry out IW Work for[9]. In line with current practice, the organisations are required to employ at least one licensed IW installer who has registered for each type of cable that they intend to carry out installation for; and

(c) Administratively, IDA intends to charge a $30 and $100 fee[10] for the 1st registration (regardless of one or multiple cable types) under the Installer's class licence and Contractor's class licence respectively, and not impose any further fee for subsequent registrations (for additional types of cables). Further, individuals who presently hold Installer's Licences and are deemed class-licensed to carry out IW Work for twisted-pair cables under the new framework (as described under paragraph 13(a)) will not have to pay the fee.

For the avoidance of doubt, IDA may suspend or cancel the relevant licence, whether in whole or in part, in the event of a breach of licence conditions or any provision of the IW Code by individuals under the Installer's class licence or by business organisations under the Contractor's class licence. IDA may also impose conditions for the re-instatement of suspended licence(s).

14. IDA believes that the move to a class licensing scheme for the Installer's licence framework, and the proposed fee structure for both the Installer's and Contractor's class licences, will help to manage the costs to the industry that may result from expanding the IW Framework to cover the additional three types of cables. As IDA proposes to adopt a class licensing scheme for Installers, IDA intends to discontinue issuing hardcopy licences to registrants of both the Installer and Contractor class licences. However, IDA will publish,

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[8] In other words, such licensees will not be required to pass any further courses to carry out IW Work for twisted-pair cables. They will, however, be required to pass the relevant courses for the other three types of cables if they want to carry out IW Work involving those other types of cables.

[9] Similar to the Installer's Licence class licensing regime, business organisations wishing to carry out IW Work involving all four types of cables will need to register for each of the four types of cables. The registrations can take place at the same time or at different times.

[10] These amounts are based on the licence fees under the current IW Framework whereby IDA currently charges application fees of $30 for an Installer's Licence and $100 for a Contractor's Licence.

on the IDA website, details of Individual and Contractor class licensees[11]. This will enable end-users to conduct their own checks to determine which installers or contractors are licensed by IDA.

15. While IDA is mindful of the compliance cost of additional regulatory measures, there is still a need to ensure that good quality IW Work is carried out for all four commonly-used cables. As part of quality assurance measures and to facilitate investigation if there are complaints, IDA proposes to include, as a licence condition under the IW Regulations, the requirement that installers and contractors who carry out any IW Work shall be required to sign off on, and retain records of, the IW Work carried out. IDA will also require that such records be retained for at least twelve (12) months from the date of completion of the IW Works. Where necessary, IDA may request such records as documentary evidence.

16. In addition, IDA will require that the records (referred to in paragraph 15), at the minimum, indicate:

    (a) the particulars of the licensed installer(s) employed by the contractor who carried out the IW Work;

    (b) completion date of the IW Work;

    (c) the type of IW Work carried out; and

    (d) the location/address of the premises where the IW Work was carried out.

    In the situation where different installers or contractors carry out IW Work for different cables in the same premise, each installer or contractor will be required to sign off on and retain records of the specific type of IW Work carried out in that premise.

Question 4: IDA invites views and comments on the proposed revisions to the IW Work licence structure:

- *to change the licensing regime for Installers, which is presently based on "individual licensing", to a "class licensing" regime;*
- *to deem individuals who presently hold Installer's Licences (with respect to twisted-pair cables) to be registered or "class-licensed" to carry out IW Work for twisted-pair cables under the new framework;*
- *to discontinue issuing hardcopy licences to registrants of both the Installer and Contractor class licence and IDA will publish, on the IDA website, details of Individual and Contractor class licensees.*
- to *retain the present "class licensing" regime for the Contractor's Licence (for business organisations), but modify it such that organisations will need to register for each type of cable that they intend to carry out IW Work for;*
- *the proposed licence fees; and*
- *to include as a licence condition under the IW Regulation, the requirement that installers and contractors sign off and retain records of IW Works carried out.*

[11] IDA currently publishes the list of existing IW Work licensees at: https://tls.ida.gov.sg/tls/TlsLicenceSearchFormAction.do?dispatch=searchLicence.

Transition Period

17. To provide persons and organisations who intend to be licensed under the proposed revised IW Framework with sufficient time to obtain the necessary certifications and employ the qualified persons to carry the IW work, IDA proposes to allow a transition period of 9 months before this revised framework takes effect. That is, the IW Framework will take effect 9 months after the IW Framework is finalised and announced. However, IDA will commence the process to register trained or qualified applicants and organisations who intend to carry out the relevant IW work during the transition period to ensure smooth implementation of the framework. All installers and organisations who intend to carry out the IW work must have a relevant licence from the effective date onwards. The current framework will continue to apply during the transition period, i.e., persons who are not holders of telecommunication wiring installers' licences will not be prohibited from carrying out IW work for coaxial, structured, and optical fibre cables during the transition period. As for persons and organisations who hold existing Installer's/Contractor's Licences, these licensed installers may continue to carry out IW Work on twisted-pair cables under the existing Installer's Licence during the transition period. Upon the conclusion of the transition period, these installers will be deemed registered or "class licensed" to carry out IW Work for twisted-pair cables.

Question 5: IDA also invites views and comments on the length of the proposed transition period to allow existing installers to obtain the necessary certifications and obtain licences from IDA.

Proposed Revisions to the IW Regulations

Definition of "Internal Telecommunication Wiring"

18. IDA proposes to clarify that the definition of "internal telecommunication wiring" under the revised IW Framework refers to any cabling which is used or intended to be used for telecommunications that is located within the property boundary of a landed or multi-storey building development (whether residential or non-residential). The "property boundary" would be the boundary as set out in the title deeds to the relevant property, and which is usually physically demarcated by a wall or fence surrounding the property (see **Appendix A** for illustrations of property boundaries)[12].

19. In this respect, IDA proposes to move away from the present definition in the IW Regulations which relies on the "interface point" with a PTL to demarcate what is considered "internal telecommunication wiring". In a multi-cable environment, there could be various possible interface points for the different types of cabling within any given property (see **Appendix A** for illustrations of

[12] For the avoidance of doubt, in the case of a multi-storey building, IDA intends to use the property boundary of the building (and not the individual units within the building); and in the case of a multi-storey-multi-building development owned/managed by a common entity (for example, condominium developments, which are managed by a management corporation), we will use the property boundary of the overall development.

the various possible interface points), leading to ambiguity as to what constitutes "internal telecommunication wiring". IDA believes that the proposed clarification avoids this problem[13].

Question 6: IDA invites views and comments on the proposed revised definition of "internal telecommunication wiring".

Other Changes to the IW Regulations

20. IDA also proposes to make the following revisions to the IW Regulations:

(a) Alignment of enforcement framework and provision of true and accurate information.

IDA notes that under regulation 11(1)[14] of the IW Regulations, IDA may, by notice in writing, cancel or suspend a licence if the licensee is determined not to have fulfilled certain specific requirements (e.g., regulation 11(1)(a) provides that the licence may be suspended if a licensee has performed or carried out any telecommunication wiring work not in accordance with the IW Code) or under certain scenarios (e.g., liquidation of the business organisation). On the former, IDA's intention is for licensees to take the necessary measures to avoid contravening the requirements ascribed under regulation 11 of the IW Regulations that may result in a cancellation or suspension of the licence (e.g., to perform IW Work based on IW Code so that such licensee would not breach regulation 11(1)(a)). For greater clarity and to better reflect this intent, IDA proposes to revise the IW Regulations to reflect these requirements and scenarios as conditions of licence under the respective installer and contractor class licences instead.

IDA also proposes to align: (i) the enforcement framework for regulation 11(1) to that as set out under the Telecommunications Act; and (ii) the enforcement approach for breaches of installer / contractor licences under the IW Regulations with the approach taken for breaches of other type of licences as may be issued by IDA.

[13] To be clear, the IW Framework only seeks to regulate the quality of the IW Work being performed and does not address the determination of who owns, nor does it confer ownership to any person of, any particular cable in any property. These are matters best addressed through other laws (e.g., property laws), and IDA is not proposing any change to the scope of the IW Framework in this respect.

[14] Regulation 11(1) of the IW Regulations is as follows:

The Authority may, by notice in writing, cancel or suspend, for such period as it thinks fit, a licence if the licensee
(a) has performed or carried out any telecommunication wiring work otherwise than in accordance with the Code of Practice;
(b) has caused or allowed any telecommunication wiring work to be performed or carried out by an unlicensed telecommunication wiring installer;
(c) has made, or caused, or allowed to be made or produced in or in connection with any application by him, or on his behalf, for a licence, any false, misleading or inaccurate information, whether in writing or not;
(d) has, in the opinion of the Authority, contravened any of the provisions of the Act or these Regulations or with any of the conditions of the licence;
(e) gives notice to the Authority in such form and manner as the Authority may determine that he has ceased to be a telecommunication wiring contractor or telecommunication wiring installer, as the case may be;
(f) has ceased to carry on any business or trade as a telecommunication wiring contractor or telecommunication wiring installer and his registration, if any, of the business under the Business Registration Act (Cap. 32) is cancelled; or
(g) being a company incorporated under the Companies Act (Cap. 50) or a limited liability partnership registered under the Limited Liability Partnerships Act 2005 (Act 5 of 2005), has gone into liquidation other than for the purpose of amalgamation or reconstruction.

As the effectiveness the IW licensing framework is dependent on the provision of true and accurate information at the point of registration by the respective applicant, it is necessary to deter applicants from providing false, misleading or inaccurate information (i.e., provided for under regulation 11(1)(c) of the IW Regulations) (including any false declaration of qualifications). Accordingly, IDA intends that a contravention of the requirement for the provision of true and accurate information under the revised IW framework would constitute an offence going forward.

(b) <u>De-criminalisation of minor offences</u>

IDA proposes to de-criminalise the provisions in the IW Regulations (i.e., regulations 5(3) (b) and 6(6)) which require licensees to notify IDA of changes in their particulars[15]. The criminalisation of such provisions may have been important in the past to ensure compliance by licensees, as information was not as easily available to IDA. However, with computerisation and online searches now available for IDA to obtain updated licensee information, the currently stipulated penalties may not commensurate with a breach of such an administrative nature.

(c) <u>Removal of non-essential provision</u>

IDA proposes to remove the provision in the IW Regulations (regulation 14) requiring internal telecommunication wiring licensees to seek IDA's approval before stopping or refusing to carry out IW Work for any user. IDA has not received such requests for approval from the industry, and is of the view that such matters may be left to commercial arrangements between the industry players and end-users; and

(d) <u>Removal of fee for IW Code</u>.

IDA proposes to remove:

(i) the provision in the IW Regulations (regulation 4(2)) which indicates that IDA may make available the IW Code to any person upon the person's request and the person's payment of free specified in the First Schedule to IW Regulations; and

(ii) the fee payable for each copy of the IW Code in the First Schedule to IW Regulations. With the ease of access of Internet and IDA's publication of the IW Code on the Internet, the IW Code can now be obtained without charge from the Internet.

21. With the inclusion of coaxial, structured and optical fibre cables into the IW Framework, there may be situations where a licence issued under the IW Regulations may be suspended or cancelled in part (e.g., suspension or cancellation of a licence in respect of structured cables only, such that the licensee may continue with the installation of other types of wirings for which

[15] Presently, non-compliance with these provisions would amount to an offence attracting fines of up to $10,000 and jail terms of up to 3 years.

he is registered). In this regard, IDA may, at its discretion, suspend or cancel that part of the licence relating to the specific type of telecommunication cable involved in the breach, or suspend or cancel the licence as a whole and will review the IW Regulations to make this clear.

22. Other than the proposed revisions as detailed above, IDA intends to retain all the provisions of the IW Regulations[16] insofar as they are consistent with the revised IW Framework.

Question 7: IDA invites views and comments on the proposed revisions to the IW Regulations and suggestions on any other changes that IDA should implement.

Proposed Revisions to IW Code

23. IDA proposes that, in-line with the proposed revisions to the IW Framework to also focus on coaxial, structured, and optical-fibre wiring, the scope of the IW Code should be similarly revised to cover these three types of wiring in addition to twisted-pair wiring. While the proposed revised IW Code embraces many areas such as standards, specifications and practices for different types of cables, IDA is cognisant that not all the areas may be relevant to different IW Work installers/contractors. Thus, the proposed revised IW Code is structured in sections for different types of wiring. IW Work installers/contractors may refer to the relevant sections in the proposed revised IW Code, to ensure that their cable installation works are of good quality and meet the minimum technical requirements stated in the IW Code.

Question 8: IDA seeks views and comments on the content and structure of the draft revised IW Code, which is attached as an Annex to this consultation document, and suggestions on any changes to the IW Code.

PART III: INVITATION TO COMMENT

24. IDA invites the industry to comment on the proposed revisions to the IW Framework as stated in the above paragraphs, the draft revised IW Code and any other related issues not covered in this consultation document.

25. All views and comments should be submitted in soft copies (preferably in Microsoft Word Format) via email to **IDA_Consultation@ida.gov.sg** with the subject “Consultation on the Review of Internal Wiring Framework” and should reach IDA by **12 noon, 15 August 2014**. Respondents are required to include their personal or company particulars, correspondence address, contact number and email address in their submissions. IDA will make all or parts of any submissions made in response to this consultation paper public and disclose the identity of the source. Any part of the submission which is considered commercially sensitive must be clearly marked and placed as an

[16] Consequential changes to IW Regulations would be required as a result of: (a) proposed inclusion of coaxial, structured and optical fibre cables into IW Framework; (b) proposed change in licensing regime of installer from an individual licensing regime to a class licensing regime via a registration process; (c) proposed discontinuation of issuing hardcopy licences and proposed publication of details of Installer and Contractor class licensees; and (d) proposed inclusion of additional condition to require Installers and Contractors to sign off and retain records of IW Works carried out.

annex to the comments raised. IDA will take this into account in its review. All comments should be addressed to:

Aileen Chia (Ms)
Deputy Director-General (Telecoms & Post)
Infocomm Development Authority of Singapore
10 Pasir Panjang Road
#10-01 Mapletree Business City
Singapore 117438

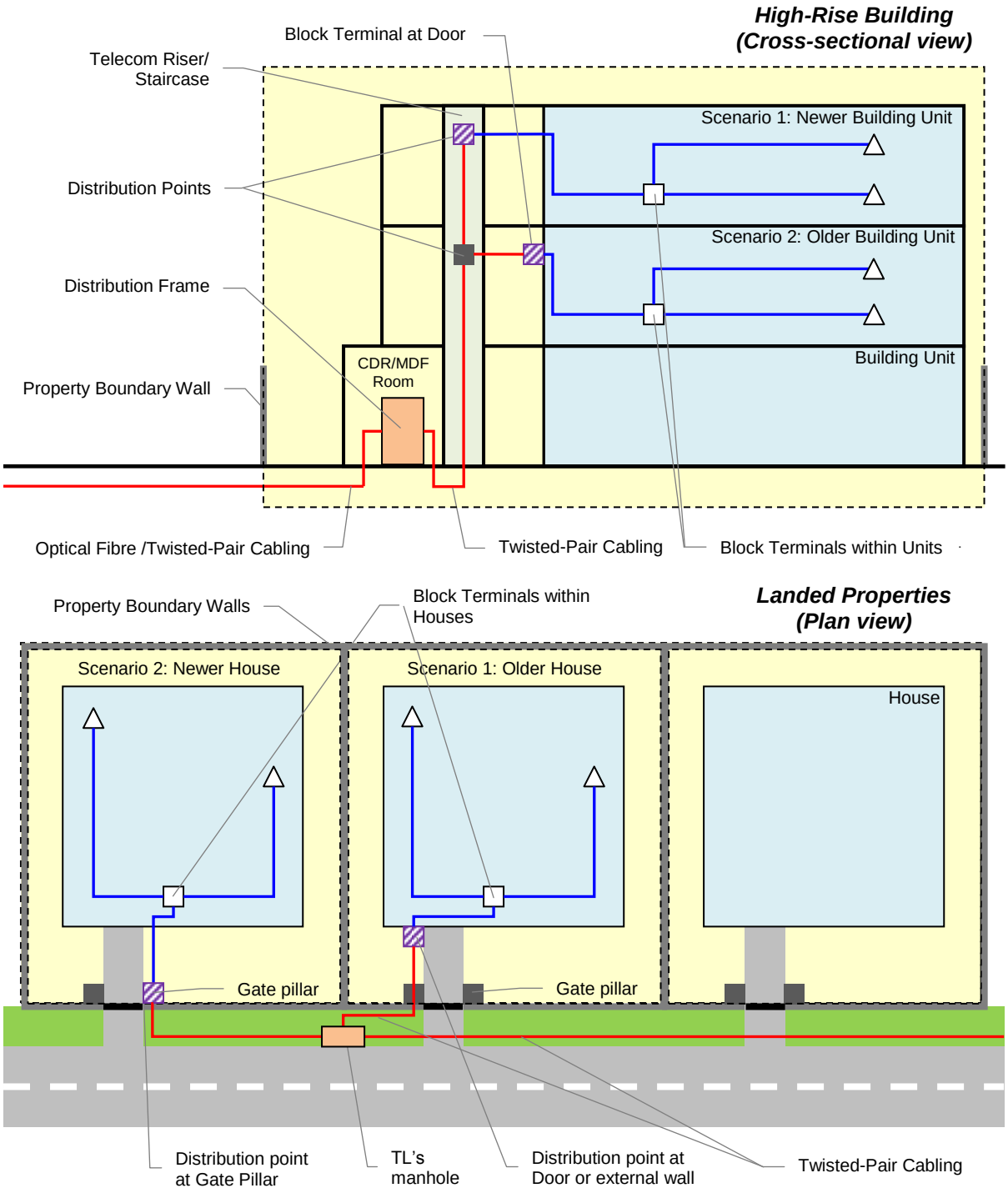
26. Following the close of the public consultation IDA will carefully consider all responses received prior to finalising its final policy position. Thereafter IDA will make the necessary changes to the IW Regulations, the IW Code and the Installer's and Contractor's Licences in order to finalise the changes to the IW Framework.

Appendix A

INTERNAL TELECOMMUNICATION WIRING CONFIGURATIONS AND PROPOSED INTERNAL WIRING BOUNDARIES

Twisted-Pair (Category 3) Cabling

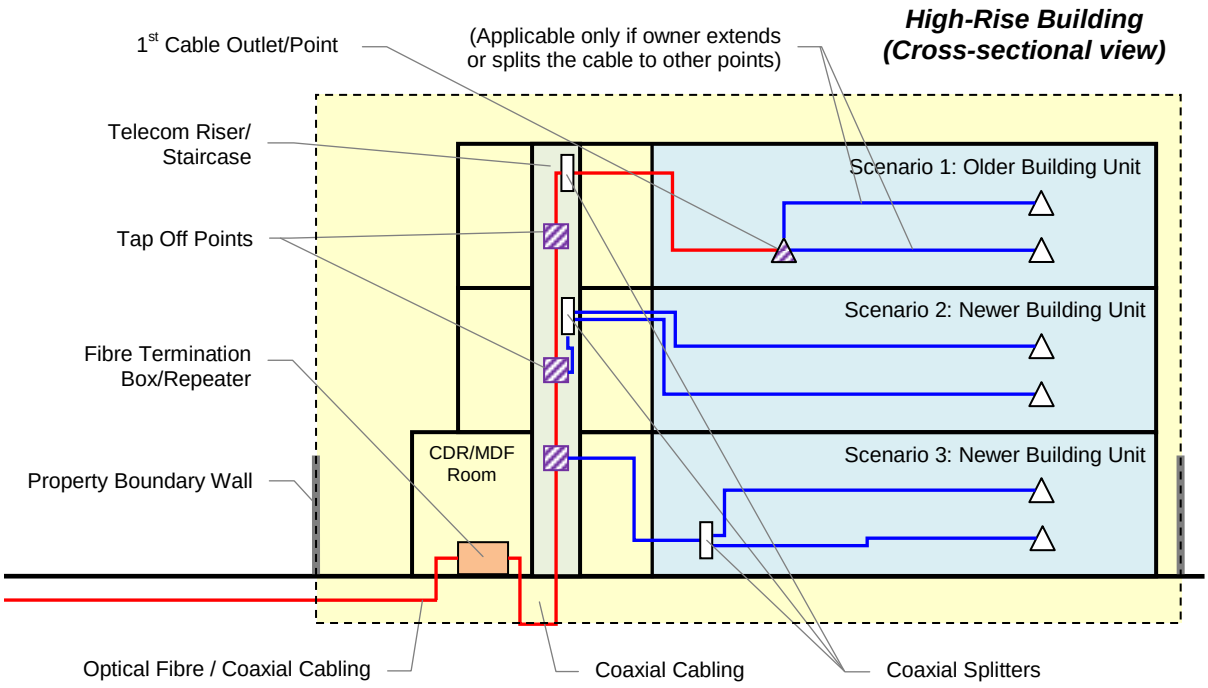
(Possible Interface Points with Telecommunication Licensee's ("TL's") Telecoms System)

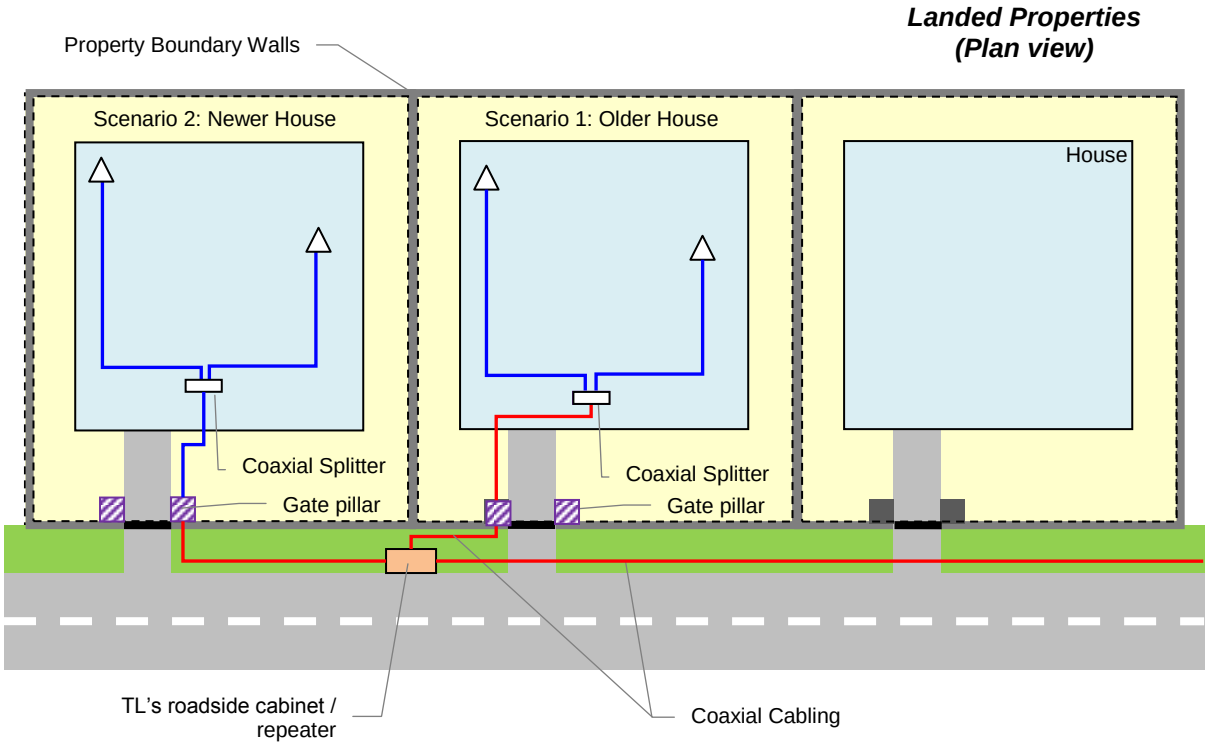


Legend:

- TL's Cabling (Optical Fibre /Copper)
- End User's/Developer's Cabling (Twisted-Pair Copper)
- Proposed Internal Wiring Boundaries
- Possible Interface Points
- Telephone Outlet/Point

Coaxial Cabling
(Possible Interface Points with TL's Telecoms System)

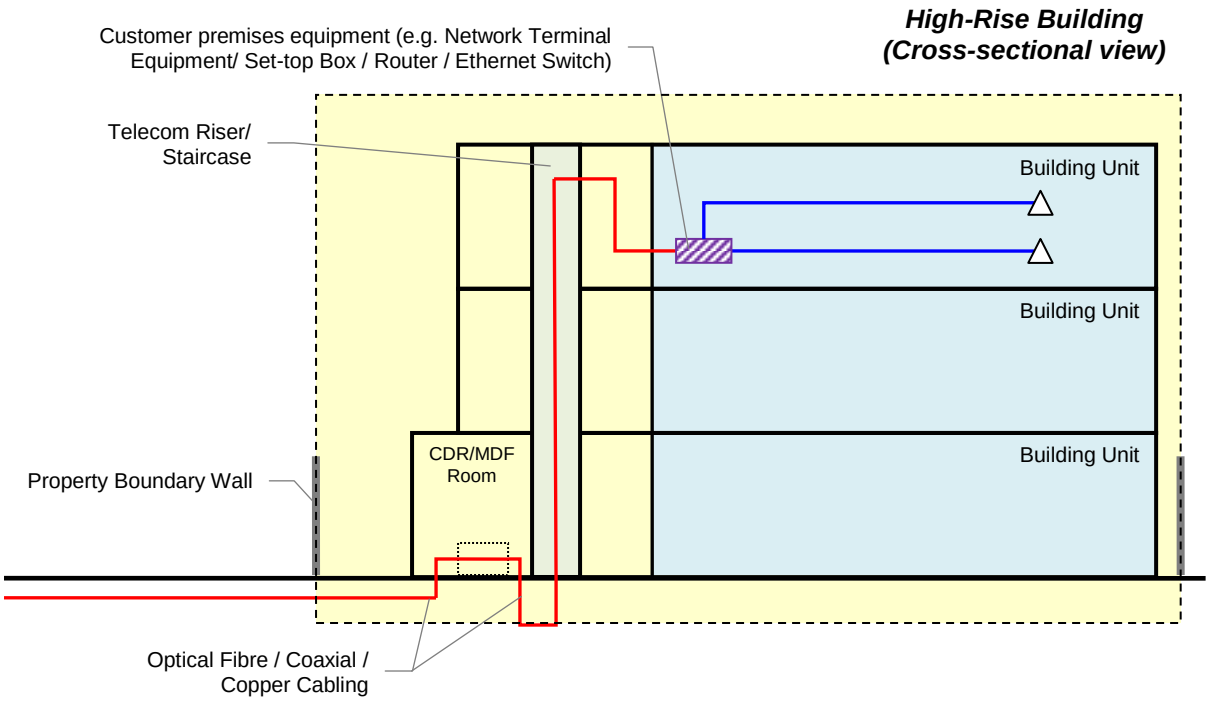


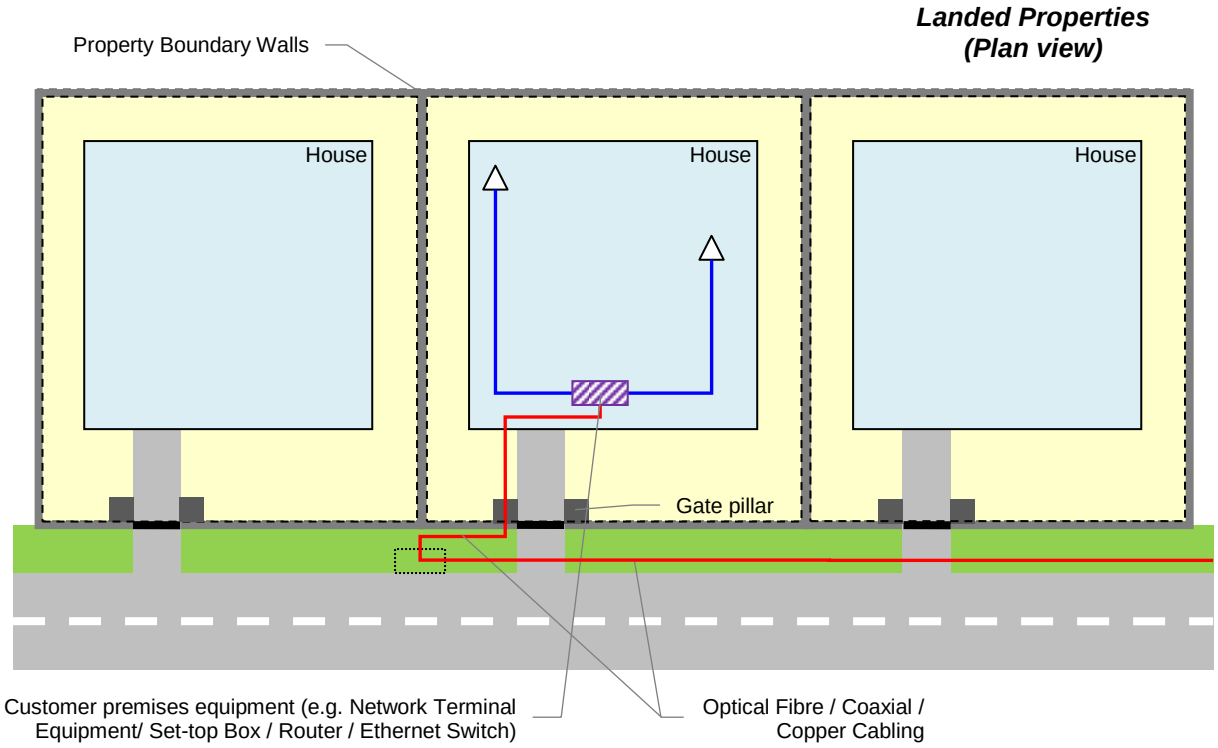


Legend:

- TL's Cabling (Optical Fibre / Coaxial)
- End User's/Developer's Cabling (Coaxial)
- Proposed Internal Wiring Boundaries
- Possible Interface Points
- Cable Outlet/Point

Structured (Category 5E and Above) Cabling
(Possible Interface Points with TL's Telecoms System)

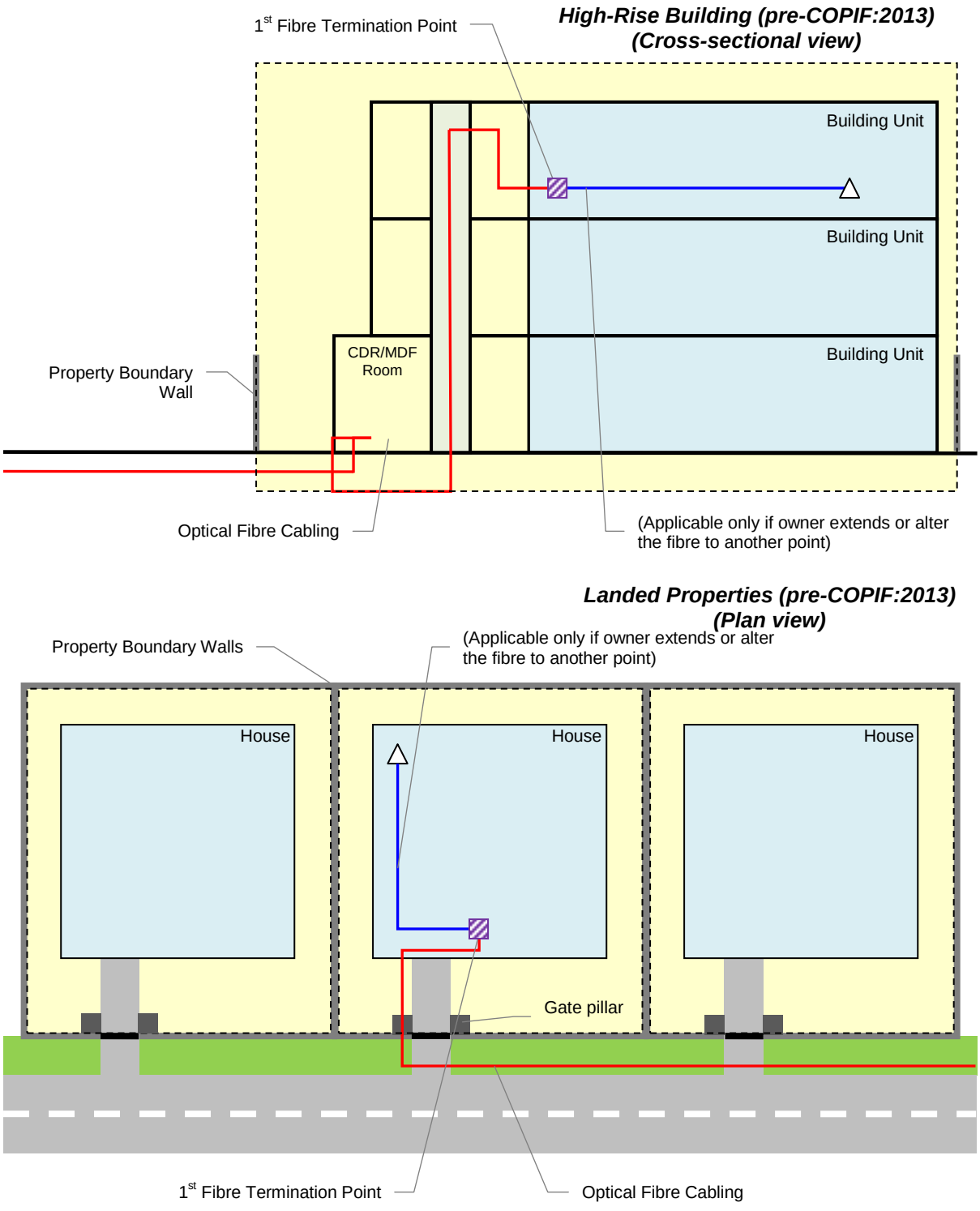




Legend:

- TL's Cabling (Optical Fibre / Coaxial / Copper)
- End User's/Developer's Cabling (Structured)
- Proposed Internal Wiring Boundaries
- Possible Interface Points
- LAN Points

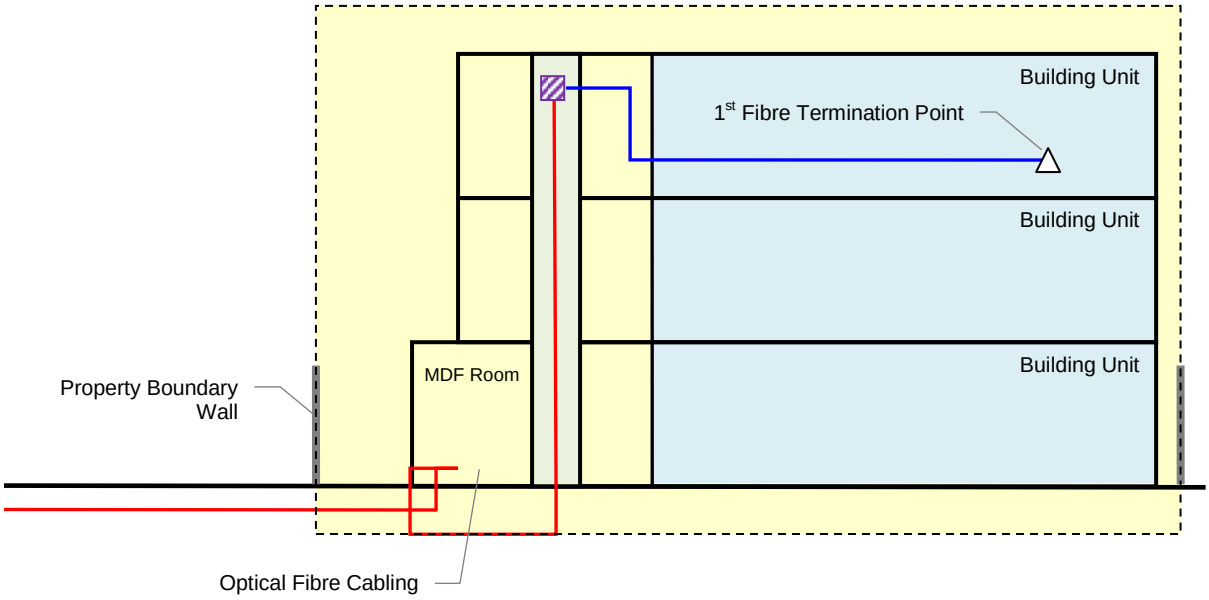
Optical Fibre Cabling
(Possible Interface Points with TL's Telecoms System)



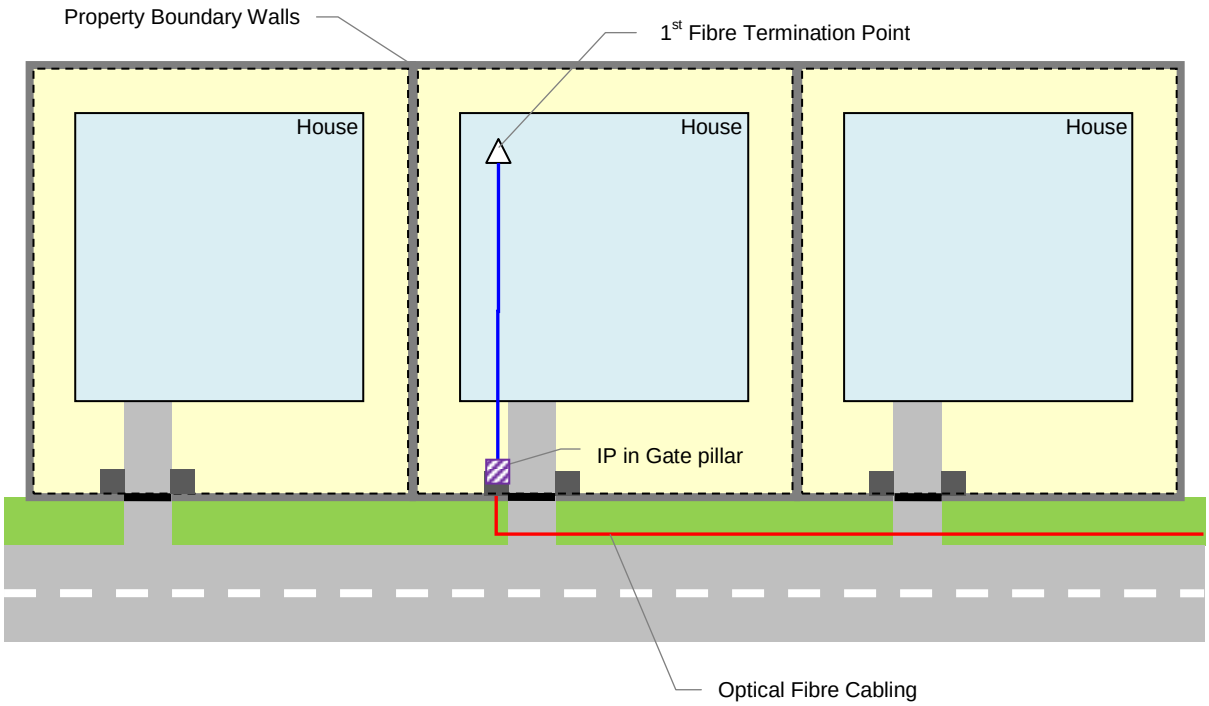
Legend:

- TL's Cabling (Optical Fibre)
- End User's/Developer's Cabling (Optical Fibre)
- Proposed Internal Wiring Boundaries
- Possible Interface Points
- Fibre Termination Points

High-Rise Building (COPIF:2013 or later)
(Cross-sectional view)



Landed Properties (COPIF:2013 or later)
(Plan view)



Legend:

- TL's Cabling (Optical Fibre)
- End User's/Developer's Cabling (Optical Fibre)
- Proposed Internal Wiring Boundaries
- Possible Interface Points
- Fibre Termination Points