



Industry Consultation on NIMS Connect Measure

22 August 2011

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INDUSTRY CONSULTATION ON NIMS CONNECT MEASURE

1. BACKGROUND/ INFORMATION

1.1 Development of Ecosystem for Interactive Multimedia, Applications and Services

1.1.1 IDA and MDA have jointly undertaken an initiative to develop a strategy to build up capabilities, infrastructure and the industry ecosystem in the area of interactive multimedia, applications and services. IDA and MDA recognise the changing trends of video consumption and the immense potential of interactive multimedia, applications and services, particularly interactive Internet Protocol television (IPTV). Television viewing is morphing from the traditional one-way distribution of video into a two-way interactive entertainment-communication experience. Interactive IPTV services can ride on the pervasiveness of the new ultra-high speed Next Generation Nationwide Broadband Network (“**Next Gen NBN**”) that Singapore is deploying to fully realise their potential.

1.1.2 As part of this initiative, IDA and MDA have launched the Next Generation Interactive Multimedia, Applications and Services (“**NIMS**”) Programme to foster the development of a conducive environment for the delivery of interactive multimedia, applications and services to the benefit of the industry, the community and the Government.

1.2 Measures to Bring About an Open Access Platform

1.2.1 IDA and MDA have conducted various Industry Dialogues under the auspices of the NIMS Programme to consult the industry on the desirability and feasibility of an open access platform for the delivery of interactive multimedia, applications and services to consumers over the Next Gen NBN (“**OA Platform**”). A brief summary of the previous Industry Dialogues is set out in Section 2 of this Consultation Paper.

1.2.2 Based upon the feedback received, IDA and MDA believe that an OA Platform will catalyse the development of a competitive industry ecosystem for the delivery of interactive multimedia, applications and services by lowering barriers of entry for new market participants. Existing industry players will also benefit by being able to leverage the OA Platform, as well as the Next Gen NBN (which is designed to be an open access network), to bring their services to a greater pool of consumers in a more efficient manner. Each retail service provider (“**RSP**”) would retain its ability to

compete on the basis of the attractiveness of its branding and products. The consumer's interests will also be enhanced as the consumer will be able to access a variety of service offerings from various RSPs through a common featured set-top box that has been certified by the OA Platform Operator and deployed on the OA Platform ("**CF STB**"). An elaboration of the desired outcomes that such an OA Platform would achieve and the benefits that such an OA Platform would bring can be found in Section 3 of this Consultation Paper.

- 1.2.3 In order to bring about such an OA Platform, IDA and MDA have launched a request for proposal for a NIMS Platform Operator ("**NIMSCo**"). The objective of the request for proposal is to appoint a NIMSCo that would design, finance, build, and operate an OA Platform for the delivery of interactive multimedia, applications and services over the Next Gen NBN, and provide services on a wholesale basis to RSPs in the market on non-discriminatory and non-exclusive terms. However, IDA and MDA do not foreclose the possibility that, even if the request for proposal (which is still ongoing) leads to the appointment of the NIMSCo, there could be other industry stakeholders that wish to implement other OA Platforms. The requirements that the operator of an OA Platform (such as the NIMSCo, if appointed under the request for proposal) ("**OA Platform Operator**") must minimally satisfy before the OA Platform can be designated as such is elucidated in Section 4 of this Consultation Paper.
- 1.2.4 In order for the OA Platform Operator to successfully achieve widespread adoption of CF STBs deployed on the OA Platform, there is a need to ensure that a range of compelling and high quality services from multiple RSPs is made available to consumers over the OA Platform. In this regard, IDA and MDA recognise that regulatory intervention may be necessary to enhance the value proposition of the OA Platform to consumers.
- 1.2.5 IDA and MDA would therefore like to consult the industry on certain proposed measures to require Nationwide Subscription TV Licensees outside the OA Platform who are providing video delivery services over the Next Gen NBN ("**Connecting RSPs**") to connect into and make all interactive multimedia, applications and services acquired or otherwise obtained by such Connecting RSPs on or after the effective date of the proposed measures available on the OA Platform, to the extent technically feasible ("**Relevant Content**"). For the avoidance of doubt, Relevant Content includes interactive multimedia, applications and services that the Connecting RSP has existing rights over, to the extent that such rights are extended, renewed or otherwise re-contracted on or after the effective date.

- 1.2.6 Certain restrictions may also need to be enforced on the RSPs on the OA Platform (“**OA RSPs**”) to ensure that they do not frustrate the intent of the proposed “NIMS Connect” measure. Further details regarding the regulatory obligations that IDA and MDA propose to impose on the Connecting RSPs and the OA RSPs can be found in Section 5 of this Consultation Paper.
- 1.2.7 IDA and MDA are cognisant of the fact that the implementation of the proposed “NIMS Connect” measure requires various industry players to coordinate and cooperate on commercial, technical and operational issues. To this end, Section 6 of this Consultation Paper describes various implementation scenarios for the Connecting RSPs that would hopefully assist the industry in assessing the potential impact of the proposed “NIMS Connect” measure.

2. SUMMARY OF PREVIOUS INDUSTRY DIALOGUES

2.1 Introduction

- 2.1.1 IDA and MDA have previously conducted various Industry Dialogues as part of the NIMS Programme to explore the desirability and feasibility of an OA Platform. The Industry Dialogues reviewed, amongst other things, the roles of the various stakeholders in the OA Platform as well as the feasibility of adoption of standards for a CF STB.

2.2 Industry Dialogue Phase 1

- 2.2.1 Industry players have been actively engaged since the inception of the NIMS Programme. Industry Dialogue Phase 1 (“**IDP 1**”) was launched on 11 August 2009 to seek industry views on how the interactive multimedia, applications and services ecosystem would evolve over the mid-term to achieve the vision for the NIMS Programme. IDP 1 also discussed the roles that IDA and MDA, in partnership with the industry, could play to foster the development of new market opportunities and business models for delivery of interactive multimedia, applications and services to end-users. IDP 1 closed on 9 September 2009, with 30 responses received from a variety of companies across the infocomm and media industries.

2.3 Industry Dialogue Phase 2

- 2.3.1 Industry Dialogue Phase 2 (“**IDP 2**”), which focused on the development of technical specifications for the NIMS Common Featured Set-Top Box (“**NIMS CF STB**”), was launched on 18 December 2009, with the issuance of the first of three draft versions of the NIMS Common Featured Set-Top Box Functional Requirements Document

(“**FR Document**”). Industry players were invited to provide feedback and inputs which were taken into account during the drafting of the second and third draft versions of the FR Document.

2.3.2 With the launch of the IDP 2 process, IDA and MDA also invited interested organisations to apply to join the NIMS Panel. The NIMS Panel was responsible for recommending the appropriate IPTV standard(s) that would best meet the functional requirements for the NIMS CF STB. The selected standard(s) would subsequently form the basis of the reference guidelines for the NIMS CF STB that would be published by IDA and MDA. 29 applications from the industry were received, out of which 11 were shortlisted as members of the NIMS Panel.

2.4 Industry Dialogue on Adoption of NIMS Standards

2.4.1 On 20 May 2010, the Industry Dialogue on Adoption of NIMS Standards (“**ID 1A**”) was issued, to seek views and comments from the industry and members of the public on the adoption of NIMS standards. ID 1A closed on 29 June 2010 with 10 responses received from the industry.

2.4.2 ID 1A was focused on exploring the feasibility and benefits of adopting a standards-based approach to accelerate the development of a vibrant NIMS ecosystem. The ID 1A document illustrated both the long-term and immediate goals of the NIMS Programme.

2.4.3 Based on the responses from ID 1A and the NIMS Panel’s recommendation, IDA and MDA acknowledged and recognised the risks associated with standardisation. IDA and MDA came to the view that certain requirements, such as those on technical compatibility, could be calibrated to achieve the desired outcomes of the NIMS Programme. Accordingly, IDA and MDA calibrated the relevant requirements to reflect a corresponding adjustment in the approach taken to achieve these desired outcomes, and to achieve the long-term goal described in the ID 1A document, as follows:

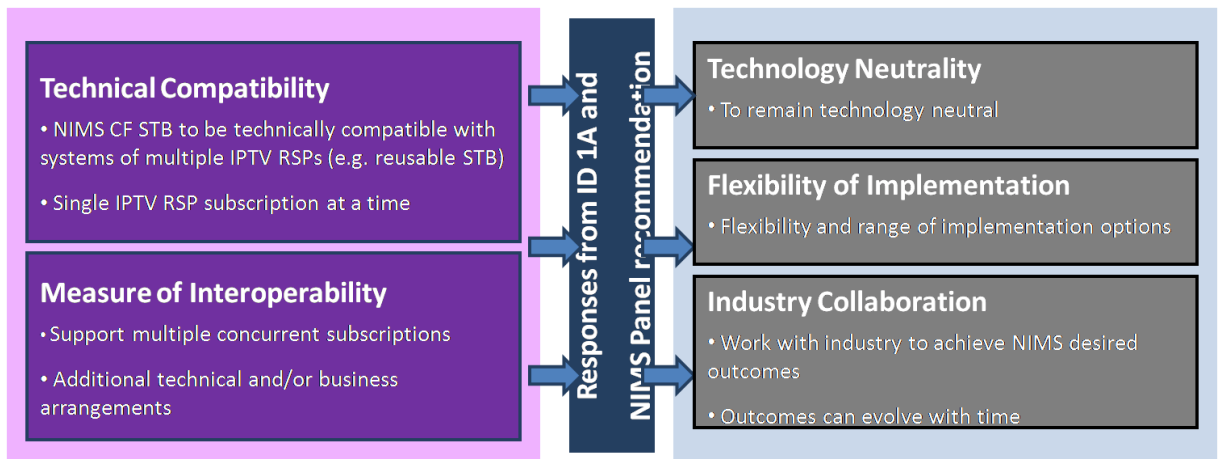


Figure 1 – Calibration of requirements to achieving the Long-Term Goal

2.4.4 IDA and MDA considered that working with the industry towards an outcome-based approach would best achieve the desired outcomes of the NIMS Programme and its attendant benefits. There was thus a refocus of the standards-based approach to be more outcome-based. Under the outcome-based approach, IDA and MDA would specify the outcomes to be achieved, and the standards required to achieve the specified outcomes will be determined by the industry and market developments.

2.5 Industry Dialogue on Outcome-Based Approach

2.5.1 Arising from the feedback received from ID 1A, an outcome-based approach, as opposed to a standards-based approach, was adopted for the NIMS Programme. The subsequent Industry Dialogue on Outcome-Based Approach (“ID 1B”) focused on articulating the principles and rationale behind the four specified desired outcomes of the NIMS Programme, which are:

- (a) Multi-RSP Support - the ability for a given consumer to access multiple IPTV RSPs’ services through the NIMS CF STB, instead of having to acquire multiple set-top boxes (“STBs”) to access the services of different IPTV RSPs.
- (b) Common Applications and Services Environment - an environment where developers would only need to write their applications once, after which these applications can be mass-deployed to NIMS CF STBs. Such an environment would foster new and innovative interactive multimedia, applications and services.
- (c) Embracing Options for Delivery - the NIMS CF STB will be capable of supporting three dominant delivery options: Over-the-Top (OTT), Digital Terrestrial Transmission (DTT) and end-to-end managed delivery over Internet

Protocol (IP) networks. Minimally, the components necessary to support these three delivery options should be built into the NIMS CF STB so that they can be activated when necessary to provide a wider range of delivery options for IPTV and other kinds of RSPs to deliver their content and services to end-users. For example, DTT support can be enabled through hardware extensions to the NIMS CF STB.

- (d) Carriage of T-Government Services - to enhance the delivery and experience of Government services for the public good. As the television continues to be an important medium for information dissemination, it is IDA's and MDA's view that the Government should have a means of delivering applications and services over the television platform. In particular, maximum reach is a necessary condition for such T-Government services, particularly the critical ones like emergency alerts.

2.6 Industry Dialogue on NIMS-Connect Requirement

- 2.6.1 In the Industry Dialogue on NIMS-Connect Requirement (“**ID 1C**”), IDA and MDA sought the industry's feedback on the extent to which there might be a need to recommend technical standards for compliance by NIMS CF STBs and whether RSPs should be required to ensure that their services can be received by such NIMS CF STBs. Similar to the approach adopted for ID 1A and ID 1B, IDA and MDA also considered the need and impact of regulatory intervention on industry players, and did not predetermine the need for such intervention at that stage.
- 2.6.2 The desired policy outcome as envisioned by ID 1C was for end-users to be able to receive the widest possible spectrum of content and service offerings available in the market, thus maximising the value and potential benefits of the NIMS CF STBs being deployed to consumers. End-users would enjoy increased convenience by virtue of being able to subscribe to a wide range of RSPs in the market without the need for additional STBs. As it would be easier for end-users to receive a wide range of content and services from multiple RSPs on the same STB, end-users would likely be more inclined to take up subscriptions from multiple RSPs. Each end-user would be provided greater flexibility to obtain his/her desired interactive multimedia, applications and services from a single NIMS CF STB.
- 2.6.3 To achieve the above policy outcome, IDA and MDA envisaged that there might be a need to require NIMS CF STBs to comply with technical standards adopted by the NIMSCo. Further, IDA and MDA recognised that there could also be a need to require

RSPs who were nationwide subscription TV licensees to ensure that the services which they provided over the Next Gen NBN could be received by end-users on NIMS CF STBs in a non-discriminatory manner.

2.6.4 IDA and MDA also took into consideration various issues relating to the implementation of the NIMS CF STBs, such as:

- (a) It was envisaged that the proposed measure would be applied on all NIMS CF STBs and nationwide subscription TV licensees providing IPTV services over the Next Gen NBN. IDA and MDA did not intend for the proposed measure to affect proprietary STBs or niche subscription TV licensees.
- (b) IDA and MDA also did not intend for the proposed measure to affect nationwide subscription TV licensees to the extent that such nationwide subscription TV licensees are delivering interactive multimedia, applications and services over legacy telecommunications networks, such as Asymmetric Digital Subscriber Line (ADSL) or Hybrid Fibre Coaxial (HFC), and not over the Next Gen NBN.
- (c) IDA and MDA envisaged that the proposed measure would require the full suite of existing interactive multimedia, applications and services provided by nationwide subscription TV licensees to be configured in a manner which was NIMS-compliant and made available to any end-user with a NIMS CF STB, upon the request of that end-user.
- (d) IDA and MDA reiterated that the intent of the proposed measure was to ensure that end-users would be able to receive the widest range of interactive multimedia, applications and services through NIMS CF STBs. IDA and MDA would, however, allow the industry to propose the most efficient technical solution as long as the objective could be achieved.
- (e) The NIMS CF STBs would have to be designed in such a way as to allow nationwide subscription TV licensees to present their respective content and service offerings in their entirety, thereby preserving their unique end-user experience.

2.6.5 A brief summary of the responses as received from industry players is set out below:

- (a) General: Respondents indicated that more clarity was required in relation to various aspects of the proposal, including (i) the proposed regulatory framework; (ii) the technical standards for NIMS CF STB; (iii) the technical

feasibility and interoperability issues between the various stakeholders; (iv) the costs and services to be offered by NIMSCo (which has yet to be appointed); and (v) the legal issues associated with making content rights available through NIMS CF STB.

- (b) Desired policy outcome: One respondent highlighted that a single STB may not necessarily be as crucial as compared to the convenience of accessing content on multiple devices. Another respondent highlighted that if the functionality of the NIMS CF STB was limited by a certain standard, this might stifle innovation and lead to limited service differentiation amongst RSPs. One respondent noted that the deployment of a NIMS CF STB which was compliant with an international standard would lower the entry barriers for newcomers into the pay-TV market.
- (c) Technical Standards for CF STBs: One respondent was of the view that further clarifications were required in respect of how the standards would be formulated, who would recommend the technical standards and whether compliance would be mandatory by all IPTV operators. Another respondent proposed that the approach should be technology-neutral or alternatively, a lower layer technological recommendation (e.g. Ethernet or IP) or a very high level (applicative domain) standard such as HTTP or XML should be adopted. One respondent proposed ITU-T as a compliant standard. One respondent opined that the recommendation of technical standards would appear to be moving away from the “outcome based” approach as previously proposed. One respondent proposed that a comprehensive certification, labelling, licensing and enforcement regime for the NIMS CF STBs should be implemented.
- (d) Requirements imposed on Nationwide Subscription TV Licensees: Some respondents felt that the proposal to require nationwide subscription TV licensees to ensure that the services which they provide over the Next Gen NBN could be received by end-users on the NIMS CF STBs would increase costs and strand existing investments. This included the requirement for nationwide subscription TV licensees to repurpose interactive multimedia, applications and services so as to make the same available on NIMS CF STBs. Some respondents were also of the view that the proposal appeared to discriminate against nationwide subscription TV licensees offering IPTV and might even de-incentivise RSPs from entering the Singapore market. One

respondent opined that the proposal amounted to nationwide subscription TV licensees subsidising other RSPs providing services over the NIMS platform, thus undermining inter-device and inter-platform competition.

- (e) Repurposing of Interactive Multimedia, Applications and Services: Some respondents highlighted that nationwide subscription TV licensees might have issues in relation to legally repurposing content as content providers would likely have enabled their Secure Content Protection (SCP) controls in relation to the content. Some respondents also opined that this proposed measure would also lead to additional costs incurred by nationwide subscription TV licensees and increase in the level of commercial uncertainty surrounding the delivery of IPTV services.

3. DESIRED OUTCOMES OF PROPOSED MEASURE

3.1 Introduction

3.1.1 Following from the discussion on the NIMS Connect Requirement in ID 1C, IDA and MDA have jointly considered the issues raised and decided that regulatory measures may be required for the successful implementation of the OA Platform. While it is recognised that the issue of the proposed “NIMS Connect” measure would impose additional obligations on the Connecting RSPs, IDA and MDA take the view that such intervention is justified by the public interest that would be served by the existence of the OA Platform and CF STBs capable of supporting multiple RSPs.

3.1.2 The desired outcomes to be achieved by the proposed “NIMS Connect” measure are further described below.

3.2 Key Desired Outcome of Proposed Measure

3.2.1 The key desired outcome of the proposed “NIMS Connect” measure is to ensure that all Connecting RSPs are required to make all Relevant Content available for reception through a CF STB located within a residential premise, to the extent technically feasible. In other words, the proposed “NIMS Connect” measure applies where a residential end-user already subscribes to services from an OA RSP, and has an existing CF STB installed within his/her residential premises (“**Relevant End-User**”). The proposed “NIMS Connect” measure would provide the Relevant End-User with the option of being able to subscribe to services from multiple Connecting RSPs (and OA RSPs) via the same CF STB.

- 3.2.2 For the avoidance of doubt, the proposed “NIMS Connect” measure does not apply where the end-user does not already possess a CF STB deployed on the OA Platform, or where the Relevant End-User elects to receive the Relevant Content through a separate STB. The application of the proposed “NIMS Connect” measure is also restricted to residential premises where the end-users’ needs are relatively homogeneous and consumers typically contract on the basis of RSPs’ standard terms and conditions. In comparison, end-users located within business or commercial premises have unique demands and greater ability to customise the agreement under which they obtain services from RSPs. IDA and MDA are therefore of the view that the public interest impetus driving the need for the proposed “NIMS Connect” measure does not apply as much to business or commercial premises at this point in time. Further information on the obligations to be imposed on the Connecting RSPs and the OA RSPs can be found in Section 5.
- 3.2.3 The proposed “NIMS Connect” measure will only apply to CF STBs deployed on the OA Platform. The OA Platform must be deployed over the Next Gen NBN and must be designated as such by IDA and/or MDA. The proposed “NIMS Connect” measure will not apply to STBs (even if such STBs qualify as CF STBs) deployed on other platforms, and will not apply to CF STBs deployed within non-residential premises. The requirement on the Connecting RSPs to make their Relevant Content available on CF STBs deployed on the OA Platform is in line with the open access nature of the underlying Next Gen NBN. Furthermore, while the Connecting RSPs are required to make their Relevant Content available on the CF STBs upon the request of the Relevant End-Users, they are free to continue providing such Relevant Content to other end-users through other STBs on any other platform (including the Connecting RSP’s own platform), regardless of the network over which such platform is deployed (e.g. ADSL, HFC or Next Gen NBN).
- 3.2.4 The Connecting RSPs are required to ensure that their Relevant Content is available on the CF STB insofar as such Relevant Content is supported by the technical capabilities of the CF STB. For example, should the Connecting RSPs choose to offer 3D content to end-users via their proprietary STBs, under the proposed “NIMS Connect” measure, they are not currently required to make available such content available on the CF STB to the extent that 3D is not technically supported by the CF STB. However, if the technical capabilities of the CF STBs are expanded in the future to include 3D, the Connecting RSPs would then be required to make their 3D content available over the CF STB.

3.2.5 IDA and MDA understand that there are various approaches that can be adopted in order to achieve the key desired outcome as stated above. IDA and MDA do not intend to prescribe the approach through which the Connecting RSPs make their Relevant Content available for reception on the CF STB, insofar as the key desired outcome articulated above is achieved.

3.3 Other Desired Outcomes of Proposed Measure

3.3.1 In addition, IDA and MDA are of the view that the following desired outcomes would reinforce the ability of the OA Platform to fulfil its function of enabling a competitive industry ecosystem for the delivery of interactive multimedia, applications and services.

3.3.2 The following desired outcomes are organised around the four conceptual stages in the industry value chain denoting various activities leading up to the delivery of interactive multimedia, applications and services to the end-user, as set out in Figure 2 below:



Figure 2 – Four conceptual stages in the industry value-chain

3.3.3 The four conceptual stages are:

- (a) Acquisition Stage: The Connecting RSP acquires the underlying intellectual property rights and other rights required to transmit the Relevant Content to the Relevant End-User through the CF STB.
- (b) Content Processing Stage: The Connecting RSP processes (or procures the processing of) the Relevant Content in order to render the Relevant Content suitable for transmission to the Relevant End-User through the CF STB (e.g. by encoding the Relevant Content in an appropriate format or encrypting the Relevant Content using an SCP mechanism supported by the OA Platform).
- (c) Delivery Stage: The Connecting RSP delivers (or procures the delivery of) the Relevant Content to the CF STB.

- (d) Consumption Stage: The Relevant Content is decoded on the CF STB and displayed on the television set within the Relevant End-User's premises.

3.3.4 Acquisition Stage

- (a) IDA and MDA recognise that the Connecting RSP would likely require additional rights in order to satisfy its obligations under the proposed "NIMS Connect" measure. Such rights may include additional licences from the content provider permitting the Connecting RSP to process the Relevant Content and deliver it through another platform (as described in the following Sections).
- (b) As Section 5 of this Consultation Paper clarifies, it is IDA's and MDA's intention that it should be the Connecting RSP's obligation to seek and obtain all rights necessary in order to allow it to implement the proposed "NIMS Connect" measure. While IDA and MDA acknowledge that the Connecting RSP will likely incur additional costs in doing so, IDA and MDA note that the Connecting RSP will also gain access to a broader set of potential end-users, and may potentially incur less acquisition costs in doing so, for example as a result of not having to supply STBs to serve those end-users.
- (c) In other words, it is envisaged that the Connecting RSP will continue to retain and service the end-user relationship, even though the Relevant Content is being received on the CF STB. The OA Platform would therefore increase the size of the market for the Connecting RSP, as well as the efficiency with which it can address this market. IDA and MDA believe that any concerns that the Connecting RSP may have in relation to the use of the OA Platform should be addressed by the requirements that have been imposed on the OA Platform Operator (e.g. the requirement that the OA Platform Operator should be restricted to the provision of wholesale video delivery services and would not have any retail relationship with end-users). Likewise, any misgivings arising from the use of the CF STB (which may belong to the OA RSP) should also be addressed by the restrictions that have been imposed on the OA RSP, as described in Section 5 of this Consultation Paper.
- (d) In the implementation of the proposed "NIMS Connect" measure, it is IDA's and MDA's desire that the Connecting RSP should be able to retain its distinct branding by retaining control over the look and feel of its respective Interactive Service Guide ("ISG") or equivalent listing(s).

- (e) When successfully implemented, from an end-user's perspective, the various RSPs available on the CF STB would be presented to the end-user on a home screen. Upon the selection of an RSP, the ISG (or equivalent) specific to that particular RSP would be presented to the end-user. IDA and MDA believe that this is critical in ensuring that the Connecting RSP is able to compete with other RSPs based upon its content, branding and marketing strategies. This is illustrated in Figure 3 below.

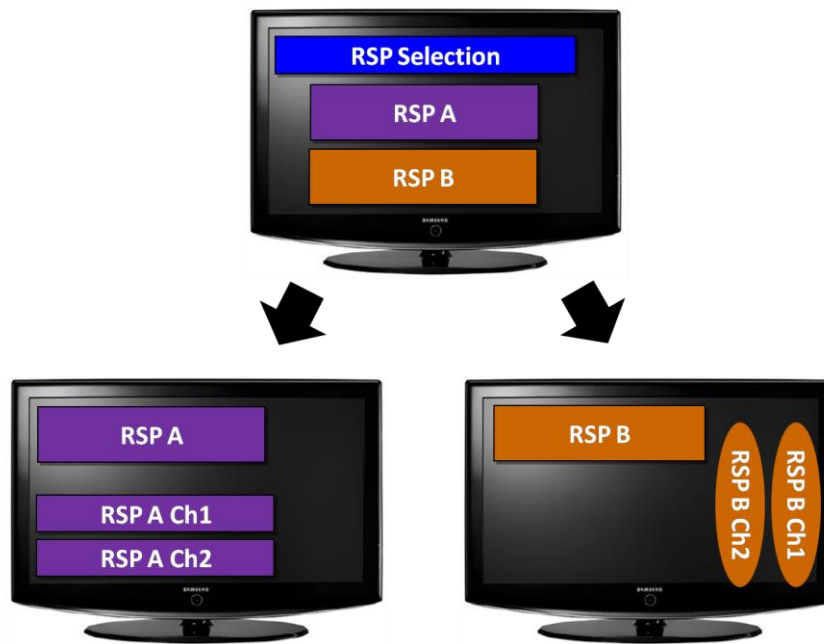


Figure 3 – Nationwide RSPs to retain distinct branding

3.3.5 Content Processing Stage

- (a) The OA Platform Operator is envisaged to be an open access, wholesale video delivery service provider. As such, it will provide non-discriminatory prices and services to all RSPs, including Connecting RSPs subject to the proposed “NIMS Connect” measure.
- (b) The OA Platform Operator will provide a full suite of services catering to the needs of RSPs of various profiles on an *à la carte* basis. For example, the Connecting RSPs can choose to either pass their raw content to the OA Platform Operator for encoding or send the encoded content directly to the CF STB. Some possible approaches are examined in greater detail in Section 6 of this Consultation Paper.

- (c) Minimally, it is envisaged that the Connecting RSPs would have to procure operator and service discovery and bandwidth services from the OA Platform Operator in order to ensure that the Connecting RSPs and their Relevant Content are recognised and made discoverable on the CF STBs, and that the Relevant Content will be transmitted to the CF STB through the existing wireline connection. Subject to the foregoing, the Connecting RSPs can use portions of their existing video delivery platform to process their Relevant Content.

3.3.6 Delivery Stage

- (a) IDA and MDA note that in order to minimise the inconvenience to the Relevant End-User, it may be necessary for the entity who has established a connection to the Relevant End-User's premise to share its connection with the Connecting RSP. This will ensure that the Relevant End-User is able to receive content from multiple RSPs, including the Connecting RSP, through the same wireline connecting the CF STB to the optical network terminal in the Relevant End-User's premise.
- (b) In order to minimise the operational complexities associated with the implementation of the proposed "NIMS Connect" measure, IDA and MDA envisage that, by default, the connection should be procured from the OA Platform Operator. In other words, the OA Platform Operator will procure bandwidth over the Next Gen NBN from the NGNBN OpCo or other operating companies and resell such bandwidth as part of its service offering to all OA RSPs and Connecting RSPs. The OA Platform Operator will therefore co-ordinate and manage the sharing of the bandwidth between all RSPs (both OA RSPs and Connecting RSPs) on the OA Platform. It is envisaged that the OA Platform Operator will offer such bandwidth to all OA RSPs and Connecting RSPs on the basis of a standard offer and at prices, terms and conditions that are non-discriminatory. For the avoidance of doubt, the foregoing does not preclude the OA Platform Operator from levying different charges based on differences in the characteristics of the bandwidth required (e.g. different class of service), insofar as the same price is offered for all OA RSPs or Connecting RSPs requesting for bandwidth of the same nature.
- (c) It is possible for RSPs to adopt a different delivery model from what is described above, provided that the alternative delivery model does not prejudice the achievement of the desired outcomes. Thus, for example, it may

be possible for an OA RSP to procure its own bandwidth for the delivery of its video services to the Relevant End-User, provided that the OA RSP is willing to assign its rights over such bandwidth to the OA Platform Operator if another OA RSP wishes to make its content (or a Connecting RSP wishes to make its Relevant Content) available to the Relevant End-User through the CF STB. The first OA RSP would also need to appoint the OA Platform Operator to co-ordinate and manage the sharing of the connection as described above.

3.3.7 Consumption Stage

- (a) The OA Platform and the CF STB will be based on open standards. As such, it is possible for the Connecting RSPs to design, build and operate a video delivery platform and a STB that is technically-compliant with the standards employed on the designated OA Platform.
- (b) However, being technically-compliant would not be sufficient to ensure that such STB would be able to receive interactive multimedia, applications and services from multiple RSPs. As such, STBs have to be certified by the OA Platform Operator in order to be deemed compliant, and certified as CF STBs. Once thus certified, each of such CF STBs will be able to receive interactive multimedia, applications and services made available by any RSPs on the OA Platform. This certification process would ensure, amongst other aspects, that the CF STB is technically-compliant with the standards employed on the OA Platform and does not prejudice the open access nature of the OA Platform.
- (c) These key aspects articulated above would ensure that only certified CF STBs would be able to receive interactive multimedia, applications and services from Connecting RSPs in accordance with the proposed “NIMS Connect” measure.
- (d) Where a Connecting RSP operates a video delivery platform that is technically-compliant with the standards employed on the OA Platform, it is possible that the Connecting RSP would provide end-users with a CF STB that has been certified by the operator of the OA Platform, for use on its own platform. In such an instance, even though such CF STBs are technically able to receive content from the OA RSPs, the receipt of such content will be subject to commercial negotiations between the Connecting RSP and such OA RSPs. There is no obligation, under the proposed “NIMS Connect” measure, on OA RSPs to make their interactive multimedia, applications and

services available for reception through certified CF STBs that are not connected to the OA Platform.

3.4 Benefits of OA Platform

3.4.1 End-users

- (a) Greater Consumer Choice - IDA and MDA envisage that the OA Platform will facilitate a more vibrant and competitive ecosystem for interactive multimedia, applications and services. A more vibrant market means the existence of multiple RSPs offering such interactive multimedia, applications and services, with a greater and more diverse range of service offerings. With greater competition in the market, end-users can have more choice of RSPs and service offerings. Examples of services beyond basic video content which could be accessed through the television could include securities trading, food ordering and home shopping. Beyond a greater variety of service offerings, it is also envisaged that end-users will be able to access multiple RSPs concurrently using the same device. This would minimise the need for end-users to incur the cost and inconvenience of switching devices whenever they switch RSPs.
- (b) Enhanced Digital Experience - Beyond greater choice, it is also envisaged that end-users' digital experience will be enhanced. An enhanced experience means greater personalisation, control and interactivity. An example of greater personalisation and control would be targeted advertisements with short and long form options for end-users to select based on personal interest. Examples of more interaction with video content include being able to influence the outcome of singing competitions in real time by voting or purchasing that trendy outfit donned by the lead protagonist in a movie on the spot.
- (c) Widened Web Access - Finally, interactive IPTV services could also widen web access by acting as the medium through which end-users can access web services and content through the television set. As the television set provides a more familiar and user-friendly interface than the traditional personal computer, web access could be widened to include a larger segment of the population. It is noteworthy that some form of content repurposing is likely to be necessary for optimal viewing, as web content is typically not designed for television viewing, and web access is likely to be implemented

through specialised applications or widgets, as opposed to a generic web browser.

3.4.2 Industry

- (a) Increased Revenue Opportunities - In the vibrant ecosystem generated by the OA Platform, RSPs will have increased revenue opportunities as their service offerings could extend beyond providing home entertainment to Singapore's one million residential households to hospitals, hotels and other public arenas. For example, hospital wards could be equipped with television screens capable of interactive services like real-time remote patient monitoring or alert systems, facilitating better patient care. Beyond healthcare, the television sets sitting in over 40,000 hotel rooms in Singapore also present a potential market opportunity for RSPs to deliver services such as interactive advertising or other tourism-related applications. Digital signage in public places delivering customised and contextual advertising could bring new shopping experiences to consumers and in return generate more sales for merchants.
- (b) Interactivity Enabling New Business Models - As higher levels of interactivity and capabilities are incorporated into video content and consumption devices, new business models could be developed and deployed in the market. Such new business models could include targeted and contextualised advertisements, info-mediary service and e-procurement applications over interactive IPTV. RSPs can leverage interactive features to increase revenues from existing customers or attract new customers to become their subscribers.

3.4.3 Government

- (a) Delivery of T-Government Services – The OA Platform also seeks to enhance the delivery and experience of e-government services to the public. Today, some countries are already delivering government services to their citizens via the television set. For example, the South Korea government provides polling and emergency alert services through the television. The UK government delivers information and practical advice about public services in one place, Directgov.uk, accessible through the web, mobile or television. Accessing Directgov.uk enables UK citizens to do things like search for jobs or find local services such as post offices and solicitors.
- (b) Innovation Opportunities for T-Government - A vibrant ecosystem opens up immense innovation opportunities for the delivery of T-government services to

the public through the interactive IPTV platform. Being able to deliver T-government services through the home television set with a more familiar and user-friendly interface as well as through the personal computer will mean new opportunities for government agencies to transform the end-user experience by delivering novel and creative T-government services and applications. Examples of these T-government services include interactive learning services for continuing education from home or a public warning system to disseminate information about a flu pandemic or dengue outbreak. Nationwide services such as utility metering and monitoring could also be enabled on an interactive IPTV platform.

- (c) Government Touch-points with Citizens In Every Home - Bringing interactive capability over multiple platforms such as the television or digital signage in HDB lobbies would increase the number of touch-points between the public and the Government. This would enable the Government to reach out to the less infocomm-savvy members of the public who are more comfortable with the television as compared to personal computers and mobile phones.

3.4.4 Content Providers

For content providers (including studios and distributors), the OA Platform is an opportunity to extend coverage onto new channels and also to potentially reach consumer directly from a secure hosted environment. The key benefits to the content providers are as follows:

- (a) The ability to reach a large number of households.
- (b) As a qualifying RSP, the ability to potentially offer its content library or application catalogue directly to consumer (if intended).
- (c) A common video-application headend where in/over applications can be mixed with video, thus extending the brand and enabling up-sell or cross-sell. It is envisaged that an application that pushes targeted advertising could be developed.
- (d) A platform with diligent content security that could potentially be extended to include domain-based SCP, sideload, offline, etc. thus offering additional up-sell and cross-sell opportunities.
- (e) A, persistent platform and thus less ongoing requests for security approvals of devices.

3.4.5 Application Developers

For application developers, the OA Platform is an opportunity not only to sell applications based on a low entry-barrier and high-yield model, but to collaborate with content and data providers for rich interactive innovation. The key benefits to the application developers are as follows:

- (a) The ability to reach a large number of households on a common platform, i.e. less application repurposing.
- (b) A common video-application headend where applications can be mixed with video, thus extending the brand and enabling up-sell or cross-sell. As this may have a service delivery-like platform (SDP) architecture, the prevalence of content, application and data providers offers greater opportunity for new “mashup” applications.
- (c) A curated experience that fosters quality standards and end-users’ trust in the system and its applications.
- (d) A neutral application environment without bias towards any player.
- (e) The use of a declarative application environment in the CF STB with support for one or more of HTML, XHTML, DHTML, CSS, DOM, JavaScript (ECMAScript), XML, Unicode, delivered in both HTTP and HTTPS. It is envisaged that HTML5 is a supported variant for application client-side.
- (f) As the applications’ client side should use a declarative syntax (to be defined in the OA Platform Reference Guidelines), this allows some flexibility of the application developers’ use of server-side/ backend systems.

3.4.6 STB/CE Manufacturers

For STB/CE manufacturers, the OA Platform is an opportunity not only to sell end-user devices but to build a value-chain of content, applications and services, thriving within a secure environment where participants can both compete and collaborate. The key benefits to the STB/CE manufacturers are as follows:

- (a) The ability to reach a large number of households on a common platform.
- (b) The ability to offer exclusive CE devices, i.e. branded, RSP-specific CF STBs and remote controllers.

- (c) STB/CE aligned to standardised systems thus avoiding proprietary product line silos.
- (d) A CF STB conformance regime that qualifies STB/CE prior to service activation and in so doing fosters quality standards and end-users' trust in the system and its offerings.

4. REQUIREMENTS ON OA PLATFORM OPERATOR

4.1 Introduction

- 4.1.1 At the lowest layer of the Next Gen NBN, the Network Company ("**NGNBN NetCo**") is responsible for the design, finance, build and operation of the Next Gen NBN passive infrastructure, which includes ducts and wirelines. The NGNBN NetCo offers this passive infrastructure at a wholesale, non-discriminatory and cost-competitive basis to its Qualifying Persons ("**QPs**"), of which the Operating Company of the Next Gen NBN ("**NGNBN OpCo**") is one.
- 4.1.2 The NGNBN OpCo is responsible for the design, finance, build and operation of the active infrastructure over the Next Gen NBN passive infrastructure, which includes network switches and routers. The NGNBN OpCo provides bandwidth connectivity services to RSPs on a wholesale basis.
- 4.1.3 The OA Platform Operator is responsible for the design, finance, build and operation of the OA Platform. The OA Platform provides open access wholesale interactive video services to RSPs.
- 4.1.4 The OA Platform Operator shall facilitate, on a fair, transparent and non-discriminatory basis, the provision of wholesale interactive video services to RSPs serving end-users located at residential premises across mainland Singapore and connected Singapore islands.
- 4.1.5 The OA Platform Operator is also responsible for the management of bandwidth for the delivery of interactive multimedia, applications and services to CF STBs. The OA Platform Operator would thus need to co-ordinate with operating companies and RSPs, as and where necessary, to manage the connection of the CF STB to the optical network terminal in each end-user's premise.

4.2 OA Platform

- 4.2.1 The OA Platform is expected to be an open access infrastructure for the delivery of wholesale interactive video services to RSPs. It shall include capabilities such as the

discovery and selection of RSPs and services available on the OA Platform, the secure delivery of linear and non-linear wholesale video services, and the ability to support interactivity through a common application and service environment.

4.2.2 The OA Platform is a critical enabler in developing a vibrant ecosystem for interactive multimedia, applications and services where multiple RSPs compete not only upon video services, but also through offering higher levels of interactivity. The OA Platform must therefore be built upon open access principles.

4.2.3 The OA Platform Operator shall ensure that the following open access principles are adhered to:

- (a) the OA Platform Operator shall provide wholesale video delivery services, including operator and service discovery, to all qualifying RSPs on a non-discriminatory and non-exclusive basis;
- (b) the OA Platform shall deliver RSPs' interactive multimedia, applications and services as-is without modification; and
- (c) the OA Platform shall make available and provide RSPs access to an interface to manage the RSPs' service requests and services.

4.2.4 For the purpose of Sections 3.4.4(b) and 4.2.3(a), a qualifying RSP shall be:

- (a)
 - (i) any holder of a licence granted under the *Telecommunications Act* for the provision of facilities-based operations and/or services-based operations; or
 - (ii) any holder of a licence granted under the *Broadcasting Act*, excluding class licensees;

in each case, where such licence holder has been approved by IDA and/or MDA; or

- (b) any other person IDA and/or MDA may designate.

4.2.5 The OA Platform Operator shall aim to design the OA Platform with the following design principles and considerations:

- (a) a common application and service environment;
- (b) standardisation of OA Platform;
- (c) support for a wide variety of RSPs;

- (d) facilitate migration of RSPs onto the OA Platform;
- (e) empower RSPs' management of service requests;
- (f) development of the CF STB; and
- (g) delivery over multiple technologies (e.g. managed IPTV, OTT, DTT).

4.3 Common Application and Service Environment

- 4.3.1 In a vibrant ecosystem, it is envisaged that consumers will be able to enjoy access to a wide variety of innovative interactive applications and services over the OA Platform.
- 4.3.2 Application developers and RSPs should be able to develop interactive applications and services for the OA Platform in a convenient manner, and as far as possible, without the need to re-purpose the applications.
- 4.3.3 To encourage and nurture a critical mass of developers with the necessary skill sets to develop interactive applications and services for the OA Platform, the OA Platform shall enable applications developers and RSPs to develop third party applications using standards-based web development languages.
- 4.3.4 The middleware implementation in the OA Platform should support various forms of interactivity for end-users, including:
 - (a) interactivity that is in-channel;
 - (b) interactivity that is off-channel;
 - (c) interactivity that is content-specific; and
 - (d) interactivity that is content-independent.
- 4.3.5 Examples of interactive applications which shall be supported by the OA Platform browser implementation include:
 - (a) activation of widgets to retrieve traffic updates on television;
 - (b) retrieval of a football player's game statistics while viewers are watching a football match on television; and
 - (c) polling functionalities in a game show program for viewers at home to play alongside game show participants.

4.3.6 The OA Platform shall minimally adopt a browser-based Declarative Application Environment (DAE). RSPs may implement additional middleware environment(s) beyond the baseline capabilities offered by the OA Platform. Application developers may develop interactive applications and services over these RSP-specific middleware implementations, however, these interactive applications and services will be RSP-specific.

4.3.7 T-Government Services

- (a) The OA Platform shall support the delivery of any announcements or other programmes to end-users in the public or national interest or in the interests of public security, national defence or relations with the government of another country.
- (b) Beyond the delivery of the announcement or programmes mentioned in subparagraph (a) above, the OA Platform may also support the delivery of other T-government services to end-users. Such support may be in the form of providing hosting services for T-government services or aggregation of T-government services from multiple Government agencies.

4.3.8 Application Stores

- (a) Application stores have been described as the new “must-have” digital business model¹. Beyond RSP-commissioned applications for the video services delivery market, the applications store harnesses the larger community of applications developers to create innovative applications for the video services market.
- (b) The OA Platform should incorporate the necessary components on a wholesale, “white-label” basis, using which RSPs may then construct and provide their respective application stores.

4.4 Standardisation of OA Platform

4.4.1 Benefits of standardisation

- (a) Standardisation can help to minimise fragmentation of the interactive video services market in Singapore. A standards-based approach can facilitate robust competition in the ecosystem, potentially lowering the cost of video-based services delivered to the market through economies of scale.

¹ Reference: <http://www.zdnet.com/blog/hinchcliffe/the-app-store-the-new-must-have-digital-business-model/1172>

- (b) A standards-based environment can also optimise the applications development process as the applications do not need to be re-purposed for different platforms. This can jumpstart an ecosystem of interactive multimedia, applications and services in Singapore by building a critical base to attract applications developers.
- (c) The benefits of standardisation include the ease of integration and inter-operation among multiple solutions, as well as cost benefits associated with economies of scale. However, there should be room for service differentiation and innovation, particularly at the retail service level.
- (d) It is anticipated that the OA Platform would involve the standardisation of only a few components, on the basis of their criticality, as opposed to the end-to-end standardisation of the whole IPTV value-chain.
- (e) As an example, SCP has been identified as one of the critical components for standardisation in the OA Platform. While standards and solutions exist for multiple SCP implementations to inter-operate, there are complexities associated with such implementations. The adoption of a standardised SCP solution is more achievable. Moreover, SCP is not a service differentiator for RSPs, and therefore, a standardised approach should not hinder the RSPs' ability to innovate and differentiate. The full set of critical components for standardisation is articulated in sub-paragraph 4.4.2 below.
- (f) The ISG is an example of a service differentiator for RSPs. The capabilities of the OA Platform shall allow and facilitate RSPs to deploy their respective ISGs in accordance with their respective corporate branding.
- (g) The above examples of SCP and ISG illustrate how the envisioned OA Platform will need to strike the right balance between standardisation and allowing sufficient flexibility to enable differentiation.

4.4.2 A Standards-based Approach for Critical Components

- (a) The OA Platform is expected to adopt a standards-based approach for the critical components below:
 - (i) operator and service discovery;
 - (ii) multimedia formats;
 - (iii) middleware; and

- (iv) SCP.
- (b) It is noted that some IPTV standards bodies develop and make available specifications for end-to-end interoperability of the IPTV ecosystem. For the avoidance of doubt, the OA Platform shall minimally implement a standards-based approach for the critical components described in sub-paragraph (a) above.
- (c) The OA Platform Operator shall make a choice on the standards to be implemented. It is expected that the OA Platform Operator may implement the standards from one of the four standards bodies as set out below:
 - (i) Digital Video Broadcasting (DVB) Project;
 - (ii) European Telecommunications Standards Institute (ETSI);
 - (iii) International Telecommunication Union (ITU); and
 - (iv) Open IPTV Forum (OIPF).
- (d) The OA Platform Operator may propose the implementation of alternative standard(s) for the OA Platform. For the alternative standard(s) proposed, the OA Platform Operator should demonstrate to IDA and MDA how the alternative standard(s) proposed is/are able to meet the open access vision and desired outcomes.
- (e) The development of IPTV standards is ongoing globally, and it is envisaged that the OA Platform Operator's choice of standards for the OA Platform will result in it being a widely adopted standard in Singapore. Therefore, the OA Platform Operator shall allocate resources for it to take active roles in participating in, and contributing to the development of the standards which it has implemented, to ensure the continued relevance of the standards for its operating environment. It is also envisioned that the standards adopted for any optional features implemented on the OA Platform can be contributed to the relevant standards bodies, and the OA Platform can be a reference implementation of such standards in the international arena.
- (f) The OA Platform Operator is expected to publish a set of guidelines setting out information regarding the technical standards deployed on the OA Platform, allowing the OA RSPs as well as Connecting RSPs to understand how to provision their services over the OA Platform ("**OA Platform Reference Guidelines**"). These technical standards shall conform to technical

standards recommended by the Telecommunications Standards Advisory Committee (“**TSAC**”) and endorsed by IDA. It is envisaged that the process for the publication of, and the making of subsequent amendments to, the OA Platform Reference Guidelines will be managed by the OA Platform Operator.

4.4.3 In its choice of IPTV standards, the OA Platform Operator shall ensure the standard body (or bodies) of its choice can fulfil the following:

- (a) is progressive and its work keeps up with the rapid technological advancement and developments in the video services industry;
- (b) conducts standards conformance and interoperability tests and certification exercises to ensure cross-solutions interoperability;
- (c) enjoys the support and adoption of solutions providers and Consumer Electronics (CE) manufacturers such that the OA Platform is able to benefit from supplier diversity; and
- (d) enjoys widespread adoption internationally such that the OA Platform is able to enjoy competitive prices in its choice of suppliers due to global economies of scale.

4.4.4 Implementation of a Standardised Metadata Schema

- (a) Beyond basic video and interactive applications and services, the open access vision aims to develop supporting systems that are part of or add-ons to the OA Platform that interface to adjacent ecosystems, such as online advertising.
- (b) Today, content is distributed to RSPs through various means, including the manual delivery of content on physical media, satellite transmission of content, as well as online delivery of content in digitised formats. With the trend towards interactive media and content, it is increasingly important to be able to streamline and optimise the workflow for the distribution and management of such content from the content providers to RSPs in the value chain.
- (c) Standards for metadata schemas exist to facilitate and streamline this process. The OA Platform Operator should put in place a metadata schema for the purpose of efficient distribution of interactive media and content from the content providers to the OA Platform.

- (d) With the implementation of a standardised metadata schema in the OA Platform, RSPs should be able to add value to content and provide in-video interactive capabilities.
- (e) Through the implementation of additional capabilities such as audience measurement and recommendation engines, RSPs should have the ability to collect transaction-based, behavioural data from the end-user. Contextual advertising can then be inserted or overlaid over video content in a highly targeted manner. Such contextual advertising empower advertisers to understand the audience and enable them to create better and more targeted campaigns.

4.5 Support for a Wide Variety of RSPs

- 4.5.1 The OA Platform envisions a vibrant ecosystem with a wide variety of RSPs providing video-based services. The OA Platform shall be able to support RSPs of various profiles and having different requirements.
- 4.5.2 A ‘thin’ RSP may prefer to focus on its core competencies, and may thus purchase wholesale (as opposed to build its own) interactive video services from the OA Platform Operator (e.g. content management system, content caching systems, encoding and encryption services, video headend, application environment (compute and storage), and software-as-a-service). To address the needs of such an RSP, the OA Platform would need to incorporate the necessary capabilities to offer a sufficiently complete list of wholesale video services.
- 4.5.3 A ‘thick’ RSP may instead prefer to build certain components of the video delivery platform itself and deliver video content directly to the CF STB. A thick RSP will only need to procure minimal components from the OA Platform Operator (e.g. operator and service discovery). To address the needs of such an RSP, the OA Platform would need to support the “unbundling” of its wholesale service offerings, such that the thick RSP can exercise flexibility in purchasing only selected wholesale services from the OA Platform Operator.
- 4.5.4 The OA Platform shall support the necessary capabilities to meet the needs of both thick and thin RSPs operating on the OA Platform by offering components of the video delivery platform and application environments in an *à la carte*, hosted manner with appropriate Application Programming Interface (API) support to integrate those components to RSP-provided components.

4.5.5 An RSP may offer non-video applications and services such as browser-like entertainment (e.g. games), education or utilities and audio or telephony services. The environments which these applications and services require should similarly be supported by the OA Platform in a way that meets the needs of both thick and thin RSPs.

4.6 Facilitate and Support Migration of RSPs onto the OA Platform

4.6.1 Should existing RSPs in the pay TV landscape in Singapore wish to migrate to use the OA Platform, the OA Platform Operator shall facilitate and support the migration of these RSPs on to the OA Platform.

4.6.2 Other video delivery platforms in the market may also be used to connect to the OA Platform so as to facilitate the migration of RSPs across these platforms.

4.6.3 To grow a vibrant open access ecosystem and encourage the entry of new RSPs, the OA Platform Operator shall facilitate and support the migration of these RSPs on to the OA Platform.

4.7 Empower RSPs' Management of Service Requests

4.7.1 In a vibrant open access ecosystem, it is envisaged that the OA Platform Operator would support multiple RSPs in the management of their service provisioning requests. The OA Platform Operator should enable the RSP to easily manage such service requests (including the submission, tracking, modification and deletion of requests for service provisioning or service changes) by providing an appropriate interface, such as a web portal or APIs integrated with the OA Platform Operator's Operations Support System (OSS) and/or Business Support System (BSS).

4.7.2 Beyond facilitating the ease of management of RSPs' service requests, the interface provided shall also incorporate the necessary capabilities to empower RSPs to control and differentiate their respective retail services. Examples of capabilities to be supported include the ability for RSPs to:

- (a) update the look-and-feel of their ISGs in accordance with their respective corporate branding;
- (b) manage the programs and schedules listed in the their ISGs in accordance with their respective content;
- (c) update the look-and-feel of their application stores in accordance with their respective corporate branding; and

- (d) control the applications and widgets, including those developed by third party developers, listed in their respective application stores.

4.8 Development of the CF STB

4.8.1 The CF STB plays a pivotal role in shaping the basic capabilities which the OA Platform shall support.

4.8.2 The CF STB should adopt a “layered” approach to enable its support for multiple profiles of functions. This will enable greater consumer choice and allow RSPs to differentiate their service offering through device innovation.

4.8.3 The CF STB should comprise the following layers of features:

- (a) Basic Features; and
- (b) RSP-Specific Features.

4.8.4 Support for Basic Features

- (a) The OA Platform shall minimally incorporate the necessary capabilities to support all the Basic Features articulated in the OA Platform Reference Guidelines. Examples of these capabilities include (but are not limited to) the following:
 - (i) discovering multiple RSPs and their retail services;
 - (ii) controlling the number and identity of RSPs which can be discovered, including broadcasting RSPs who deliver to a CF STB with DTT capabilities;
 - (iii) decoding of video and audio streams in accordance with the encoding formats listed in the OA Platform Reference Guidelines;
 - (iv) protecting the security of content to address the concerns of content providers;
 - (v) supporting a browser-based DAE;
 - (vi) authenticating end-users and/or households subscribed to, and identity management of CF STBs associated with multiple RSPs on the OA Platform;
 - (vii) supporting metadata schemas to enable interactive advertising, so as to bring about new business opportunities for RSPs and enhanced video consumption experience for end-users;
 - (viii) supporting mechanisms to ensure good Quality of Service and Quality of Experience to end-users consuming the video-based services; and

- (ix) supporting remote management mechanisms to ensure configuration, software management, fault diagnosis and performance management functions can be fulfilled.
- (b) The OA Platform Operator may over time decide to implement additional capabilities to allow the OA Platform to support other Basic Features, such as:
 - (i) 3D display;
 - (ii) video conferencing;
 - (iii) home automation; and
 - (iv) payments using the cards based on the Contactless e-Purse Application (CEPAS) specifications.
- (c) It is acknowledged that these capabilities are still in the development phase and may not have reached a level of maturity for inclusion in the OA Platform as a minimum capability. However, in designing and architecting the OA Platform, the OA Platform Operator should take the future needs of the market into consideration and ensure such new capabilities can be easily and seamlessly incorporated into the OA Platform.

4.8.5 Support for RSP-Specific Features

- (a) The OA Platform Reference Guidelines should also articulate examples of RSP-Specific Features, such as personal video recording capabilities, as well as CF STBs with audience measurement capabilities. The OA Platform may incorporate capabilities to enable such RSP-Specific Features to be made available on a “white-label”, wholesale basis to its RSPs. Alternatively, as RSP-Specific Features are intended to be service differentiators to allow RSPs to innovate upon and compete on, the OA Platform Operator may elect not to incorporate such capabilities in the OA Platform.

4.8.6 Multiple Devices as CF STB

- (a) IDA and MDA have acknowledged the emergence of the global trend for various CE devices to also function as consumption points for video-based services.
- (b) In addition to dedicated, standalone STBs, convergence has led to new roles for game consoles, Internet-enabled media boxes and Blu-Ray players. Such CE devices are increasingly incorporating STB capabilities and functioning as consumption points for video-based services. Television sets have also undertaken new roles as integrated STBs.

- (c) Correspondingly, IDA and MDA envisage the OA Platform to be supported by a plethora of open access-capable devices that meet the relevant requirements for certification as a CF STB under the conformance regime to be established by the OA Platform Operator.
- (d) With the open access standardisation efforts geared towards international developments, it is envisaged that the OA Platform Operator's choice of standards for the OA Platform (and correspondingly, the CF STB) will harness global standardisation trends and developments, particularly in the CE arena. Its choice of standards should be aligned with the direction of CE manufacturers as they develop devices for the video services market, where appropriate.
- (e) The ability to leverage CE devices already in the consumer's premise to also function as delivery points for interactive multimedia, applications and services reduces overlap of device capabilities. Such an approach potentially lowers the cost associated with the provisioning of the STB for both the provider as well as the consumer.

4.8.7 In view of the plethora of devices which can potentially function as a CF STB, as well as end-users' expectations to be able to enjoy a wide variety of innovative services through the CF STB, IDA and MDA envisage that both the OA Platform Operator and the RSPs should retain the flexibility to develop their respective CF STBs, subject to the requirements below.

4.8.8 To meet the needs of RSPs offering basic video services, the CF STB developed by the OA Platform Operator should be a "no-frills" version, supporting only the Basic Features. Should the OA Platform Operator offer additional platform capabilities, it may also develop more advanced CF STBs to be offered on a wholesale basis to its RSPs.

4.8.9 RSPs may elect to layer additional features and capabilities beyond the Basic Features, to allow them to offer differentiated services to end-users through premium CF STBs.

4.8.10 In the event that the CF STB is provided to an end-user on a leased basis, it is envisaged that the entity leasing the CF STB to the end-user would be responsible for maintenance and support services associated with the CF STB. In other words, where the CF STB is leased to the end-user by an RSP, the RSP will be the first point of contact in the event that any fault arises in respect of the CF STB. However, the

OA Platform Operator must facilitate the resolution of faults where the faults do not relate to the CF STB or the RSP's services, but to services of other RSPs received through the CF STB. It is envisaged that the RSP providing the CF STB would be required to share certain information collected through the CF STB with the OA Platform Operator in order to allow the OA Platform Operator to undertake such a role.

4.9 Certification of CF STBs

- 4.9.1 The OA Platform Operator shall make the OA Platform Reference Guidelines available and establish a conformance regime for the certification of CF STBs. RSPs or CE manufacturers should have the ability to submit STBs for certification under the conformance regime. The RSPs or CE manufacturers are responsible for ensuring that the Basic Features of the STB comply with the standards employed on the OA Platform, and that the RSP-Specific Features of the STB do not adversely affect the operation of the OA Platform. Upon successful validation, the OA Platform Operator shall issue a certificate indicating that the STB is suitable for use on the OA Platform as a CF STB. The OA Platform Operator shall maintain a "whitelist" of CF STBs that has been certified for use of the OA Platform. When a device is connected to the OA Platform and initiates a service discovery request, the OA Platform Operator should check that the device appears on the whitelist prior to the presentation of potential services. Conversely, the OA Platform Operator should deny services to devices which do not appear on the whitelist.
- 4.9.2 As technology and user expectations evolve, it is expected that the baseline standards that CF STBs are required to comply with will evolve. This may require the OA Platform Operator to re-validate previously certified CF STBs, and to revoke the certification awarded to the CF STB if such re-validation is unsuccessful.
- 4.9.3 The OA Platform Operator shall ensure that industry stakeholders are given ample notice before any of the standards employed on the OA Platform are amended, and provide sufficient opportunity for the industry stakeholders to provide feedback on the intended amendment(s). The OA Platform Operator should also put in place a process whereby providers of a previously certified CF STB whose certification it intends to revoke are given appropriate assistance to either render the CF STB suitable for use on the OA Platform, or to transition from the CF STB and migrate end-users to another certified CF STB.

4.10 Delivery Over Multiple Technologies

4.10.1 Global trends in the pay TV market have indicated the emergence of collaborative efforts between broadcasters and pay TV RSPs. There are several examples of such efforts in Europe, including Project Canvas (which has since been re-branded as “YouView”) in the UK (DVB-T, OTT), HbbTV in Germany (DVB-T, OTT) and SoftAtHome in France (DVB-T, IPTV, OTT).

4.10.2 To provide flexibility and choice to RSPs in Singapore to deliver their content and interactive video services to end-users, the OA Platform shall incorporate the necessary technical capabilities to support multiple delivery options, including minimally:

- (a) video delivery over end-to-end managed IP networks;
- (b) video streamed over an unmanaged connection (OTT); and
- (c) reception of digital television over DTT.

4.10.3 The CF STBs proposed by the operator of the OA Platform shall support the capability to receive DTT over DVB-T/T2². In any case, for the avoidance of doubt, the OA Platform is expected to support the delivery of video services over end-to-end managed IP networks as well as OTT. However, the OA Platform Operator is not required to undertake the responsibility for broadcasting such DTT signals.

5. PROPOSED “NIMS CONNECT” MEASURE

5.1 Introduction

5.1.1 As mentioned in the foregoing sections of this Consultation Paper, IDA and MDA are of the view that regulatory intervention may be necessary to enhance the value proposition that the OA Platform would bring to consumers. IDA and MDA would therefore like to consult the industry and the public on the proposed “NIMS Connect” measure, which seeks to require Connecting RSPs to connect into and make Relevant Content available through CF STBs located within residential premises, to the extent technically feasible.

5.1.2 The duties that IDA and MDA expect to impose on the Connecting RSPs as well as the OA RSPs pursuant to the implementation of the proposed “NIMS Connect” measure are described below. Please note that the description of the duties of the Connecting RSPs and the OA RSPs under the proposed “NIMS Connect” measure

² The specific version is to be decided subsequently by MDA.

set out in this Consultation Paper only represents IDA's and MDA's preliminary policy position as at the date of this Consultation Paper. Nothing in this Consultation Paper and the related consultation process shall create any legitimate expectations that IDA or MDA would, or otherwise bind IDA or MDA to, adopt any particular course of action or policy approach in any manner, including but not limited to the manner in which they choose to exercise their regulatory powers. In addition, IDA and MDA reserve their rights to take any action they deem appropriate pursuant to their regulatory powers without regard to and without being fettered by this Consultation Paper and the related consultation process.

5.2 Designation of OA Platform

5.2.1 As part of the proposed "NIMS Connect" measure, IDA and/or MDA will set up a framework for the designation of one or more video delivery platforms as an OA Platform. Video delivery platforms will only be designated as an OA Platform if the following conditions are satisfied:

- (a) the video delivery platform is deployed over the Next Gen NBN; and
- (b) the video delivery platform facilitates the achievement of the desired outcomes set out in Section 3 of this Consultation Paper and satisfies the open access requirements set out in Section 4 of this Consultation Paper.

5.3 Duties of Connecting RSPs

General

5.3.1 Once a video delivery platform has been designated as an OA Platform, the Connecting RSP must, upon the request of the Relevant End-User and at its own cost, make all its Relevant Content available for reception through the CF STB located within the Relevant End-User's residential premises, to the extent that such Relevant Content are technically supported on the CF STB. For the avoidance of doubt, the Connecting RSP has no obligations under the proposed "NIMS Connect" measure in respect of an end-user who does not already possess a CF STB deployed on the OA Platform, and is free to supply to such end-user its own STB and deliver the Relevant Content to such end-user through its own platform. Further, the Connecting RSP has no obligations under the proposed "NIMS Connect" measure in respect of CF STBs deployed within premises other than residential premises.

5.3.2 Relevant Content shall be deemed to be technically supported by the CF STB notwithstanding that the Connecting RSP has to modify the Relevant Content to

ensure that the CF STB is capable of receiving such Relevant Content, including but not limited to:

- (a) reformatting the Relevant Content; or
- (b) applying any SCP requirements,

in accordance with the technical standards used on the OA Platform.

Acquisition Stage

5.3.3 The Connecting RSP must ensure that:

- (a) it has the right to make any modification to Relevant Content necessary to enable the Relevant Content to be received on the CF STB; and
- (b) it has the right to broadcast the Relevant Content on the OA Platform.

5.3.4 Without prejudice to the generality of the foregoing, the Connecting RSP must ensure that it can broadcast the Relevant Content through the CF STB deployed on the OA Platform without violating or infringing any intellectual property rights owned by any of the persons from whom it acquired or otherwise obtained the Relevant Content.

Content Processing Stage

5.3.5 The Connecting RSP must procure all services, components or other inputs required to enable reception of the Relevant Content through the CF STB.

5.3.6 In particular, the Connecting RSP must minimally procure the following services from the OA Platform Operator:

- (a) operator and service discovery; and
- (b) bandwidth.

5.3.7 The Connecting RSP must comply with the OA Platform Reference Guidelines issued by the OA Platform Operator.

Delivery Stage

5.3.8 By default, the Connecting RSP must procure bandwidth services from the OA Platform Operator in order to ensure that the Relevant Content is delivered through the wireline connecting the CF STB to the optical network terminal within the Relevant End-User's premises. The Connecting RSP shall not require the Relevant End-User

to use a port on the optical network terminal other than the one to which the CF STB has been connected.

Consumption Stage

5.3.9 The Connecting RSP must make the Relevant Content available for reception through the CF STB:

- (a) in the same form as the Connecting RSP makes the Relevant Content available on other platforms (including the Connecting RSP's platform);
- (b) at the same time as the Connecting RSP makes the Relevant Content available to end-users on other platforms (including the Connecting RSP's platform); and
- (c) at a level of quality that is not inferior to the level of quality at which the Relevant Content is made available on other platforms (including the Connecting RSP's platform).

5.3.10 The Connecting RSP must not perform any act, or omit to perform any act, which may diminish, impair or otherwise degrade the viewing or customer service experience of the Relevant End-User.

5.3.11 The Connecting RSP must inform the Relevant End-User regarding the option for the Relevant End-User to receive the Relevant Content through the CF STB, and provide the Relevant End-User with all information necessary to enable the Relevant End-User to make an informed decision as to whether to exercise such option.

5.3.12 Where the Relevant End-User elects to receive the Relevant Content through the CF STB, the Connecting RSP must not discriminate in any manner in favour of end-users accessing the Relevant Content through other platforms (including the Connecting RSP's own platform). In particular, the Connecting RSP must ensure that the Relevant Content is provided to the Relevant End-User at prices (including all applicable discounts and promotions), terms and conditions that are the same as the prices, terms and conditions at which the Connecting RSP provides such content to end-users on other platforms (including the Connecting RSP's platform).

5.3.13 .]

5.4 Duties of OA RSPs

General

- 5.4.1 The OA RSP shall ensure that the CF STB supplied by the OA RSP complies and continues to comply with the OA Platform Reference Guidelines and all relevant technical standards and certification requirements stipulated by the OA Platform Operator.

Acquisition Stage

- 5.4.2 In the event that the OA RSP is the party controlling the CF STB in the end-user's premises, the OA RSP shall ensure that it has all rights, approvals or consents necessary to allow the reception of the Relevant Content through the CF STB. For example, in the event that there is a restriction in the agreement between the OA RSP and its content provider against the use of the CF STB for the reception of the Relevant Content, the OA RSP should seek to address the content provider's concerns and procure the content provider's consent to allow such reception.

Content Processing Stage

- 5.4.3 The OA RSP shall provide the Connecting RSP with such information and/or assistance as may be reasonably required by the Connecting RSP in order to fulfil the Connecting RSP's obligations as set out above.

Delivery Stage

- 5.4.4 In the event that the OA RSP is the party controlling the connection to the end-user's premises, the OA RSP shall assign the rights to use the bandwidth available on the connection to the OA Platform Operator, and appoint the OA Platform Operator to manage and co-ordinate the sharing of the bandwidth with other OA RSPs as well as the Connecting RSPs for the delivery of the Relevant Content to the CF STB. In the event that the Connecting RSP requires additional bandwidth beyond what the OA Platform Operator is able to allocate to the Connecting RSP, or requires bandwidth having characteristics different than what has been assigned to the OA Platform Operator by the OA RSP, the OA RSP shall assist the OA Platform Operator to procure the necessary bandwidth from its service provider.

Consumption Stage

- 5.4.5 The OA RSP shall not do anything to affect or prejudice the ability of the CF STB to receive content, applications or services from any RSP, including the Connecting RSP.
- 5.4.6 Without prejudice to the generality of the foregoing, the OA RSP shall not:

- (a) prevent any RSP from making available to the Relevant End-User any interactive multimedia, applications or services through the CF STB;
- (b) prevent any RSP or any RSP's interactive multimedia, applications or services from being discovered on the CF STB;
- (c) modify, delay or degrade the quality of any interactive multimedia, applications or services being transmitted to the CF STB by any RSP; or
- (d) otherwise discriminate against any RSP or any RSP's interactive multimedia, applications or services in favour of the OA RSP or another RSP, or the OA RSP's or another RSP's interactive multimedia, applications or services, whether by technical, organisational or security measures.

5.4.7 In the event that the OA RSP is the party providing the CF STB used by the Relevant End-User to receive the Relevant Content, the OA RSP must make available to the OA Platform Operator relevant diagnostic information (e.g. event logs, resource utilisation logs) collected by the OA RSP through the CF STB and enable the OA Platform Operator to share such information with other RSPs (including Connecting RSPs) providing services over the CF STB.

5.4.8 For the avoidance of doubt, the OA RSP is not required to share information that relates specifically to the OA RSP's services (e.g. logs or other analytics that pertain to behaviour of the Relevant End-User), although the OA RSP is free to enter into a commercial arrangement with other RSPs in relation to the sharing of such information.

5.5 Exemptions

5.5.1 IDA or MDA (as the case may be) may in its discretion exempt a Connecting RSP or OA RSP from any or all of the duties imposed under the proposed "NIMS Connect" measure.

5.5.2 If any Connecting RSP or OA RSP wishes to be exempted from any provision of the proposed "NIMS Connect" measure, the Connecting RSP or OA RSP shall submit a written request to IDA or MDA containing the reasons supporting its request.

5.5.3 An exemption granted by IDA or MDA may be subject to such terms and conditions as IDA or MDA may specify and may, without limitation, be on a one-time basis, temporary, permanent, for a fixed period or effective until the occurrence of a specific event. In the event that the Connecting RSP is granted an exemption in respect of any Relevant Content, the scope of such exemption may also be extended to other

content contained within the bundle, package or channel through which such Relevant Content is provided to end-users. Likewise, if such Relevant Content is part of an “add-on” bundle, package or channel, content in the “basic-tier” bundle, package or channel may also be exempted. The proposed “NIMS Connect” measure is not intended to affect the contractual arrangements between RSPs and their content providers, or change the bundling strategies adopted by RSPs. RSPs should not deliberately adopt bundling strategies in order to restrict consumer choice and/or the effectiveness of the proposed “NIMS Connect” measure.

5.5.4 Factors that IDA or MDA may take into account in deciding whether to grant an exemption to a Connecting RSP or OA RSP include (but is not limited to) the following:

- (a) the commercial impact on the Connecting RSP or the OA RSP in implementing the proposed “NIMS Connect” measure;
- (b) the level of technical difficulty for the Connecting RSP in connecting to the OA Platform; and
- (c) the ability of the Connecting RSP to procure the relevant intellectual property rights, and the terms and conditions on which such intellectual property rights are offered.

6. IMPLEMENTATION SCENARIOS

6.1 Introduction

6.1.1 As mentioned in earlier Sections of this Consultation Paper, the proposed “NIMS Connect” measure applies to Connecting RSPs (i.e. nationwide Subscription TV Licensees outside the OA Platform who are providing video delivery services over the Next Gen NBN) and OA RSPs (i.e. RSPs who are on the OA Platform). This Section does not seek to cover the potential implementation scenarios associated with the OA RSPs as the duties of the OA RSPs are relatively straight-forward and have been adequately addressed above.

6.1.2 This Section describes two possible implementation models that the Connecting RSP may wish to adopt - a thick and thin implementation model. In the thick implementation model, the Connecting RSP retains systems in-house and in the thin implementation model, the Connecting RSP utilises systems on the OA Platform. This is illustrated in the figure below.

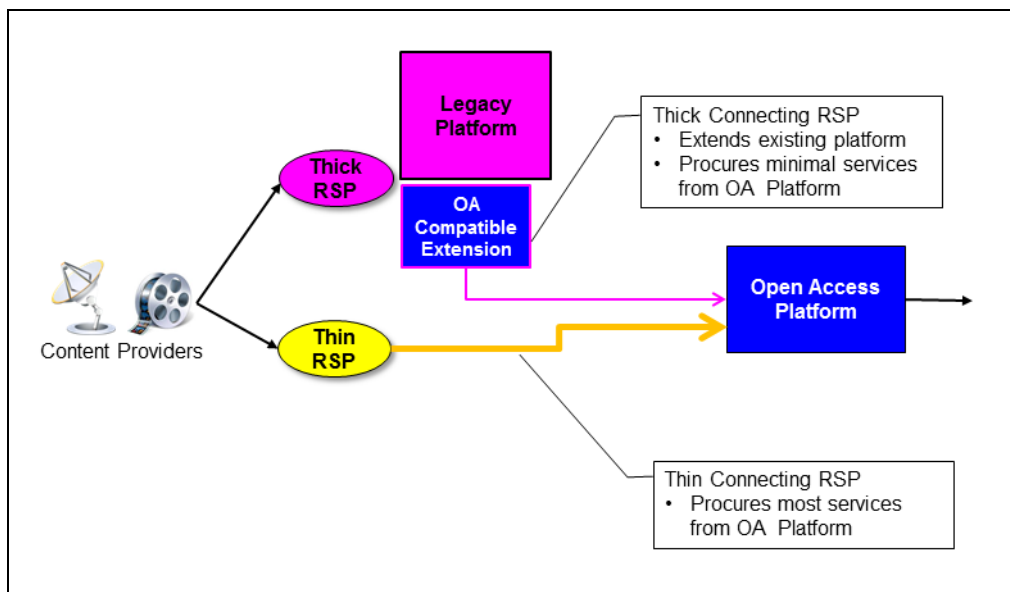


Figure 4 – Connecting RSP Implementation Models

6.1.3 In deciding whether to implement a thick or thin model, the Connecting RSP must have regard to the need to comply with the OA Platform Reference Guidelines, which will include not only technical specifications but also integration means e.g. APIs, workflows and specifics on supported variants (and possibly vendor implementations) of sub-systems such as SCP and Content Management Systems (CMS).

6.1.4 The table below highlights the roles to be undertaken by the Connecting RSP and the OA Platform Operator with respect to the major sub-systems in each stage, depending on whether the Connecting RSP adopts a thick or thin implementation model. The table below is provided for illustrative purposes only, and the precise roles to be undertaken by a particular Connecting RSP would depend upon its decision on which sub-systems would be performed on the OA Platform, and which would be performed in-house. It is envisaged that the actual implementation model adopted by the Connecting RSP could lie somewhere between the extremes shown below.

Stage	Thick Implementation Model		Thin Implementation Model	
	Performed by Connecting RSP	Performed by OA Platform	Performed by Connecting RSP	Performed by OA Platform
Acquisition Stage				
Acquire content	✓		✓	
Content Processing Stage (Sub-systems)				
(a) Operator and Service Discovery		✓		✓
(b) Ingest	✓			✓
(c) Encode	✓			✓
(d) SCP	✓			✓

Stage	Thick Implementation Model		Thin Implementation Model	
	Performed by Connecting RSP	Performed by OA Platform	Performed by Connecting RSP	Performed by OA Platform
(e) Integrated Service Guide (ISG)	✓			✓
(f) Metadata	✓			✓
(g) CMS	✓			✓
(h) Layout	✓			✓
(i) Application environments	✓			✓
Delivery Stage				
(a) Request bandwidth	✓		✓	
(b) Procure and manage bandwidth		✓		✓
Consumption Stage				
(a) Manage end-user relationship, including CF STB installation, event polling, troubleshooting and repair	✓		✓	
(b) Certify CF STB and perform device authentication		✓		✓
(c) Provision of applications	✓		✓	
(d) Approval and certification of client software, applications, etc.		✓		✓

Table 1 - Connecting RSP Implementation Models

6.2 Connecting RSP (Thick Implementation Model)

6.2.1 Introduction

- (a) The Connecting RSP operates an existing system outside the OA Platform, which is potentially based on a different set of technical standards from that employed on the OA Platform.
- (b) In meeting the proposed “NIMS Connect” measure, the Connecting RSP may extend its existing infrastructure by procuring the necessary video delivery infrastructure to deliver Relevant Content to the CF STB. Alternatively, the Connecting RSP may procure wholesale video delivery services from the OA Platform Operator. This section describes the technical implementation of a Connecting RSP who elects to extend its existing system by operating the necessary video sub-systems itself.
- (c) The Connecting RSP is responsible for acquiring its content and/or applications and maintaining the end-user relationship. For the purpose of clarity, the Connecting RSP generally operates the video headend and/or server infrastructure, and distributes the Relevant Content itself to the CF STB

over the Next Gen NBN. Where applicable, the Connecting RSP must comply with the OA Platform Reference Guidelines.

- (d) The impact to and obligations of the Connecting RSP as a result of the proposed “NIMS Connect” measure are described in Sections 6.2.2 to 6.2.6 below below.

6.2.2 Acquisition Stage

- (a) The Connecting RSP is responsible for acquiring its content and/or applications and maintaining the end-user relationship. The Connecting RSP shall acquire rights to offer all of its Relevant Content on the OA Platform as well so that the offerings are the same on both its existing system and the OA Platform system, to the extent technically feasible. The OA Platform Operator shall at its expense assist the Connecting RSP, when requested and necessary, to respond to queries from the content providers/ rights holders for content-protection requirements. As such, the OA Platform Operator’s conformance regime will likely be inspected. Rights should include both content and data feeds (where available) to facilitate interactive applications.

6.2.3 Content Processing Stage

- (a) Content ingest: It is assumed that the Connecting RSP who elects to deploy a thick implementation model would operate in-house ingest systems. As the Connecting RSP chooses, it will receive content from a variety of sources, e.g. satellite, dedicated line or tape in a variety of formats.
- (b) Encoding:
 - (i) The Connecting RSP shall encode its Relevant Content in accordance with the OA Platform Reference Guidelines.
 - (ii) H.264 encoding, also known as MPEG-4 Part 10 or Advanced Video Coding (AVC), is a commonly used format for the compression and distribution of high-definition video. Therefore, it is envisaged that the Connecting RSP’s existing encoders could support both its existing and OA Platform-compliant systems where high-definition content is concerned.
 - (iii) The Connecting RSP is responsible for the encoding quality. The Connecting RSP’s encoding of the Relevant Content for the OA

Platform should be at least the same quality as the Relevant Content the Connecting RSP delivers on its existing systems.

(c) SCP:

- (i) The Connecting RSP, as the content licensee, shall securely protect content as requested by the content rights holders in accordance with the OA Platform Reference Guidelines. SCP also enables the Connecting RSP's business rules e.g. timeframe to watch, maximum plays, maximum days, can record etc.
- (ii) It is envisaged that the Connecting RSP may want to maintain its current common CMS and Subscriber Management System (SMS). If the Connecting RSP's existing SCP system is extensible to the OA Platform, i.e. the OA Platform can be implemented as an additional channel, then the effort may be straight-forward. However, the Connecting RSP's existing SCP system may be based on a different technical standard from those deployed on the OA Platform. In such a case, the Connecting RSP will need to either extend that existing SCP system or implement a parallel SCP system compliant to the OA Platform Reference Guidelines.

(d) Operator and Service Discovery:

- (i) The OA Platform enables an operator and service discovery capability and it is envisaged the OA Platform maintains the master/ central database. The Connecting RSP shall list itself and/or its services with the OA Platform Operator for end-user discovery.
- (ii) The implementation of the operator and service discovery database can be architected in several ways:
 - (I) a central system for operator and service discovery managed by the OA Platform Operator;
 - (II) a distributed/ mirrored system for operator and service discovery managed by the OA Platform Operator and one or more RSPs; or
 - (III) a central system for operator discovery managed by the OA Platform Operator and a system for service discovery run by the providing RSP.

- (iii) The CF STB, as part of conformance to the OA Platform Reference Guidelines, should be configured with an entry point to the operator and service discovery process, typically through a Universal Resource Locator (URL) or IP address.
- (e) ISG: It is the intention that RSPs have as much control as possible over the look-and-feel and features of their user-interface as well as marketing and branding strategies when offering their services on the OA Platform. As such the Connecting RSP's ISG is left to its discretion. In the thick implementation model, it is assumed that the ISG servers are run by the Connecting RSP and while a new server, dedicated to the OA Platform, is likely required, the ease of integration hinges on the architecture of the Connecting RSP's CMS and compliance of its metadata to the OA Platform Reference Guidelines. The Connecting RSP should ensure that the ISG on the CF STB is no less featured or functional than the ISG on its existing systems, to the extent technically feasible.
- (f) Metadata:
 - (i) The Connecting RSP shall use a metadata schema in accordance with the OA Platform Reference Guidelines. In the thick implementation model, it is assumed that the Connecting RSP would prefer the metadata edit suites to be operated in-house and the content and instance description metadata servers to be run by the Connecting RSP. The following are examples of how metadata needs to be compliant and for whom it is exposed to or shared with.
 - (I) Metadata used by the Connecting RSP and not shared, e.g. detailed end-user information (such as address, NRIC, etc), thus the Connecting RSP must integrate to OA Platform's device management system. It is expected that if any end-user information resides in the OA Platform it is obfuscated and secured.
 - (II) Metadata needed to manage the playout may be kept internal for the Connecting RSP.
 - (III) Metadata pertaining only to that particular end-user (e.g. end-user usage and analytics) will be collected by the OA Platform Operator (from the CF STB) and, when RSP-specific, shared

only with that RSP. Thus the Connecting RSP may want to use this inbound data for business purposes. If necessary, the Connecting RSP may choose to process/ convert the data for integration with its existing systems.

- (IV) Metadata published to the service discovery engines (which are specific to the OA Platform) and available to all end-users e.g. (1) content description metadata including but not limited to program, title, synopsis, genre, rating, subtitles/ captioning, credit list, etc. and (2) instance description metadata such as offer information. The Connecting RSP may supply richer metadata (e.g. coupons and preference sharing) to facilitate differentiation although the extent to which that is visible and actionable within the service discovery engines requires further analysis.
 - (V) Advanced metadata to support within-content tagging available to application developers for interactivity. A licensing model may be required to expose this data.
 - (VI) Event logs that are within-service (e.g. analytics that pertain to end-user behaviour specific to an RSP's service) are envisaged to be for that RSP only and not for other parties (RSPs or the OA Platform Operator) unless it is appropriate to share such analytics with those other parties (e.g. for troubleshooting).
- (ii) For the convenience of end-users, the Connecting RSP should ensure that the metadata implemented on the OA Platform should be at least as rich as the metadata implemented on its existing systems.
- (g) CMS: While content management is especially important and elaborate for multi-channel and multi-content type RSPs, the Connecting RSP may already have a common CMS or multiple disparate CMSes, and it is the Connecting RSP's discretion how best to architect and implement a CMS for the OA Platform that integrates with its existing systems. In any case, a CMS compliant to the metadata, middleware and SCP interfaces articulated in the OA Platform Reference Guidelines will be required. The ability for the Connecting RSP's existing CMS(es) to comply with the OA Platform Reference Guidelines will drive the effort of integration.

- (h) Content Playout: In the thick implementation model, it is assumed that the Connecting RSP would operate its video headend (which presumably includes video server, network interface cards (NICs) and outgoing load balancers) and thus integrate to the OA Platform's aggregation point. Other than the aggregation of traffic, the video stream will not be processed by the OA Platform. Thus, the Connecting RSP is responsible for video quality as delivered to the OA Platform's aggregation point. The Connecting RSP may be able to re-use existing hardware and, depending on the Connecting RSP's current alignment with OA Platform Reference Guidelines, it may be able to re-use existing playout servers also.
- (i) Applications: The Connecting RSP shall support a common application and service environment in accordance with the OA Platform Reference Guidelines. The Connecting RSP can offer applications in either application stores or within the playout (e.g. "red button"). The Connecting RSP is responsible for maintaining its inventory of applications. In the thick implementation model, the hosting of the application store and the provision of environments where the applications run are likely the responsibility of the Connecting RSP. The operator of the application store and the developer are jointly responsible for qualifying that application for the basic CF STB at a minimum. It is expected that the application is signed by the developer or the Connecting RSP before placement in the application store. In summary, the applications in the store are curated by the Connecting RSP.
- (j) The following figure pictorially shows the major functions that the Connecting RSP is responsible for in the thick implementation model:

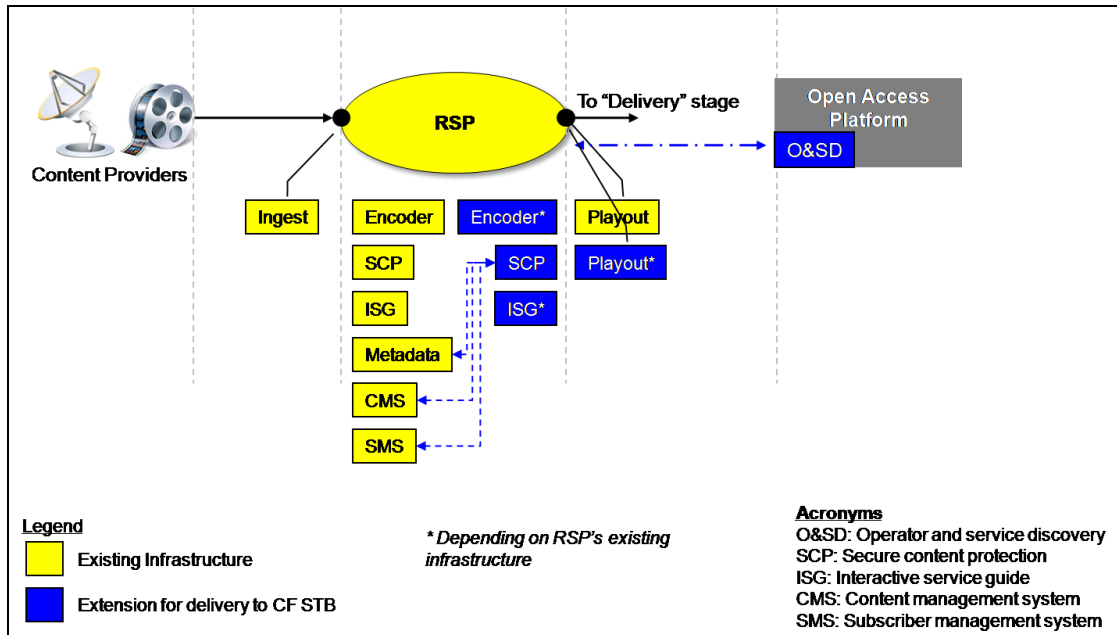


Figure 5 - Connecting RSP (Thick Implementation Model)

6.2.4 Delivery Stage

- As a default operating model, the OA Platform Operator is responsible for procuring and managing bandwidth used by RSPs delivering content and/or applications to the CF STBs.
- The OA Platform Operator will procure bandwidth from at least one Operating Company providing wholesale bandwidth services on the Next Gen NBN. The OA Platform Operator's choice of Operating Company should allow the RSPs on the OA Platform to deliver to any residential end-user who requests a service.
- Under the default model, the Connecting RSPs shall procure the necessary bandwidth to deliver the Relevant Content to the Relevant End-User from the OA Platform Operator. The OA Platform Operator will make available a service port so that the Connecting RSP can deliver its Relevant Content to the Relevant End-User through the CF STBs.
- The Connecting RSP may propose alternative delivery models for consideration by IDA and MDA, provided that the alternative delivery model does not prejudice the achievement of the desired outcomes of the proposed "NIMS Connect" measure, as set out in this Consultation Paper.

6.2.5 Consumption Stage

- (a) Specification: The process by which the specification of the CF STB is reviewed and agreed for incorporation in the OA Platform Reference Guidelines is described earlier in Section 4.4.
- (b) Conformance: The OA Platform Operator shall establish a conformance regime where the OA Platform Reference Guidelines are published, vendors (STB/CE manufacturers and/or RSPs) submit devices for approval, and the OA Platform Operator indicates the device's conformance to the OA Platform Reference Guidelines. While all devices intended to be deployed on the OA Platform require approval, the conformance regime shall cover the CF STB's conformance with the Basic Features set out in the OA Platform Reference Guidelines. The testing of RSP-Specific Features by the OA Platform Operator is limited to ensuring that those additional functionalities do not adversely affect the OA Platform and/or the Next Gen NBN. A methodology is required to maintain the OA Platform Reference Guidelines by industry dialogue.
- (c) Provision and Ownership: As the default operating model, it is envisaged that the CF STB within the Relevant End-User's premise has been procured from and is owned by an existing RSP. The default operating model also assumes the existing RSP is responsible for the maintenance of the CF STB, as described in Section 6.3.5(g) below.
- (d) Installation: The existing RSP will, upon the request of the Relevant End-User, arrange for the delivery, installation, and end-user checkout of the CF STB and that existing RSP's service.
- (e) Authentication: As described briefly in the SCP section, the OA Platform maintains a device management system and is responsible for authenticating the CF STB. When a device is connected to the Next Gen NBN and initiates a discovery request, the OA Platform Operator shall check that the device is an approved device prior to the presentation of potential operators and/or services. The OA Platform shall keep an updated profile of all devices connected to the system and periodically check all connected devices against the current minimum baseline of standard-compliance. The OA Platform should deny service to devices which are not within the minimum baseline of standard-compliance.
- (f) Service Discovery: The CF STB, as part of conformance to the OA Platform Reference Guidelines, should have been configured to seek an operator and

service discovery server, through a “burned in” IP address, URL or any other means of addressing.

- (g) Maintenance: For the CF STB, once it has been installed, the following maintenance tasks are envisaged:
 - (i) Performance monitoring: Event logs that pertain to the CF STB (e.g. hardware, software, network-related), should be collected by the RSP which provided the CF STB and, to the extent appropriate, shared (without fee) with the OA Platform Operator RSPs whose service(s) are consumed on that same CF STB.
 - (ii) Troubleshooting: If the end-user requests assistance, the existing RSP shall provide first level support. It is envisaged that the existing RSP will provide a technical help-desk style of support that logs the call and performs scripted clarification of the problem. The outcome of the existing RSP’s troubleshooting is either problem solved or problem determined to be the OA Platform (and case logged with the OA Platform Operator), or resulting in on-site assistance including for example hardware repair or replacement. It is envisaged that the OA Platform Operator facilitates cross-RSP troubleshooting, should the need arise.
 - (iii) Hardware repair/ replacement: As a result of troubleshooting, either the existing RSP or the OA Platform Operator will determine the need to repair or replace a CF STB. The existing RSP, as the owner of the CF STB, should be responsible for on-site troubleshooting at the end-user’s household should the need arise.
 - (iv) Upgrade of software: Any software update (including but not limited to firmware, operating system, IPTV or OTT client applications, plug-in features, drivers, interactive applications, etc.) must be approved by the OA Platform Operator prior to release to the field (whether that CF STB is deployed or in inventory).
- (h) Relevant Content: With respect to the consumption of the Relevant Content, it is envisioned that the following principles would apply:

- (i) The Relevant Content is offered through the CF STB, and the CF STB is validated for conformance with the OA Platform Reference Guidelines before installation by the existing RSP.
- (ii) The Relevant Content is licensed and offered by the Connecting RSP to the Relevant End-User. The Connecting RSP is responsible for the quality of the Relevant Content.
- (iii) The Connecting RSP owns the retail business relationship with the Relevant End-User, and is responsible for billing and collection.

6.2.6 Obligations

- (a) There are a number of business obligations associated with delivery of the Relevant Content by the Connecting RSP through the CF STB, including but not limited to compliance to the OA Platform Reference Guidelines, commercial relationships with content providers and/or distributors, end-user contracts, usage of the RSP portal and purchasing bandwidth management services from the OA Platform Operator.
- (b) In particular, the Connecting RSP has the following obligations:
 - (i) If appropriate, extend (or acquire) licence rights for distribution of the Relevant Content through the CF STB as described earlier.
 - (ii) Comply with the OA Platform Reference Guidelines. Depending on the implementation model chosen by the Connecting RSP, this may mean a re-use of parts of its existing system or little re-use with the non-reused systems either procured itself or procured from the OA Platform Operator. In all cases, a fundamental requirement on the Connecting RSP is to support operator and service discovery and list itself in that system so that the Relevant End-User can take-up its Relevant Content through the CF STB.
 - (iii) Procure the necessary bandwidth for the delivery of the Relevant Content to the CF STB from the OA Platform Operator as described in Section 6.2.4.
 - (iv) The Connecting RSP will maintain the retail business relationship with the Relevant End-User with respect to the Relevant Content as described in Section 6.2.5.

6.3 Connecting RSP (Thin Implementation Model)

6.3.1 Introduction

- (a) The Connecting RSP operates an existing system outside the OA Platform, which is potentially based on a different set of technical standards from that employed on the OA Platform.
- (b) In meeting the proposed “NIMS Connect” measure, the Connecting RSP may extend its existing infrastructure by procuring the necessary video delivery infrastructure to deliver Relevant Content to the CF STB. Alternatively, the Connecting RSP may procure wholesale video delivery services from the OA Platform Operator. This section describes the technical implementation of a Connecting RSP who elects to procure wholesale video delivery services, including operator and service discovery, from the OA Platform Operator.
- (c) The Connecting RSP is responsible for acquiring its content and/or applications and maintaining the end-user relationship. For the purpose of clarity, the Connecting RSP generally outsources the video headend and/or server infrastructure to the OA Platform Operator, who then distributes the Relevant Content to the CF STB over the Next Gen NBN. Where applicable, the Connecting RSP must comply with the OA Platform Reference Guidelines.
- (d) The impact to and obligations of the Connecting RSP as a result of the proposed “NIMS Connect” measure are described in Sections 6.3.2 to 6.3.6 below.

6.3.2 Acquisition Stage

- (a) The Connecting RSP is responsible for acquiring its content and/or applications and maintaining the end-user relationship. The Connecting RSP shall acquire rights to offer all of its Relevant Content on the OA Platform as well so that the offerings are the same on both its existing system and the OA Platform system, to the extent technically feasible. The OA Platform Operator at its expense shall assist the Connecting RSP, when requested and necessary, to respond to queries from the content providers/ rights holders for content-protection requirements; this is assumed to be the case as content (in the thin implementation model) will potentially reside in-the-clear within the OA Platform. As such, the OA Platform Operator’s conformance regime will vary

likely be inspected. Rights should include both content and data feeds (where available) to facilitate interactive applications.

6.3.3 Content Processing Stage

- (a) Content ingest: The Connecting RSP may ingest and process content in-house. Alternatively, it is envisaged that the OA Platform offers ingest and processing capability. As such, the OA Platform Operator, as a valued added service, may provide backend capability to receive content from a source arranged by the Connecting RSP, e.g. satellite, dedicated line or tape in a variety of formats. As content processing begins at this early stage, the proceeding sub-systems may be more efficiently accomplished on the OA Platform.
- (b) Encoding:
 - (i) The Connecting RSP shall encode its Relevant Content in accordance with the OA Platform Reference Guidelines.
 - (ii) It is envisaged that the OA Platform offers encoding capability as a valued added service, providing encoders to the Connecting RSP on either a dedicated (e.g. for linear) or shared-use (pay per use, for on-demand) model to the Connecting RSP. These may be self-service or full-service models, where the Connecting RSP or the OA Platform Operator manages the encoding job respectively. Ultimately, there will need to be clear definition of the parties' responsibility for encoding quality.
 - (iii) Notwithstanding that the OA Platform Operator may provide/ operate the encoders and even perform the encoding jobs, the Connecting RSP is responsible for ensuring that the encoding of the Relevant Content for the OA Platform should be at least the same quality as the Relevant Content the Connecting RSP delivers on its existing systems.
- (c) SCP:
 - (i) The Connecting RSP, as the content licensee, shall securely protect content as requested by the content rights holders in accordance with the OA Platform Reference Guidelines. SCP also enables the Connecting RSP's business rules e.g. timeframe to watch, maximum plays, maximum days, can record etc.

- (ii) It is envisaged that the Connecting RSP may want to maintain its current common CMS and SMS systems. In the thin implementation model, SCP (specifically key-management and encryptors) may be run by the OA Platform and therefore the Connecting RSP would provide content in-the-clear to the OA Platform for application of SCP. In this situation, the Connecting RSP would need to consider the extent to which it maintains its current common CMS and SMS systems or runs an instance/ mirror of those in the OA Platform. A hybrid model could exist where the Connecting RSP retains key-management and delegates to the OA Platform to distribute.
- (d) Operator and Service Discovery:
- (i) The OA Platform enables an operator and service discovery capability and it is envisaged the OA Platform maintains the master/ central database. The Connecting RSP shall itself with the OA Platform Operator for end-user discovery.
 - (ii) The implementation of the operator and service discovery database can be architected in several ways:
 - (I) a central system for operator and service discovery managed by the OA Platform Operator;
 - (II) a distributed/ mirrored system for operator and service discovery managed by the OA Platform Operator and one or more RSPs; or
 - (III) a central system for operator discovery managed by the OA Platform Operator and a system for service discovery run by the providing RSP.
 - (iii) The CF STB, as part of conformance to the OA Platform Reference Guidelines, should be configured with an entry point to the operator and service discovery process, typically through a URL or IP address.
- (e) ISG: It is the intention that RSPs have as much control as possible over the look-and-feel and features of their user-interface as well as marketing and branding strategies when offering their services on the OA Platform. As such the Connecting RSP's ISG is left to its discretion. The ISG may be served from the Connecting RSP's in-house system (in the thick implementation model) or

from the OA Platform; the OA Platform may offer the ISG standalone or the ISG may be very “light”, offered simply as a discoverable service. The Connecting RSP should ensure that the ISG on the CF STB is no less featured or functional than the ISG on its existing systems, to the extent technically feasible.

(f) Metadata:

(i) The Connecting RSP shall use a metadata schema in accordance with the OA Platform Reference Guidelines. The extent that metadata needs to be in accordance with the OA Platform Reference Guidelines and what metadata is exposed to whom would depend on the precise implementation model selected. The following are examples of how metadata needs to be compliant and for whom it is exposed to or shared with.

(I) Metadata used by the Connecting RSP and not shared, e.g. detailed end-user information (such as address, NRIC, etc), thus the Connecting RSP must integrate to OA Platform’s device management system. It is expected that if any end-user information resides in the OA Platform it is obfuscated and secured.

(II) Metadata needed to manage the payout which is used by the OA Platform in the thin implementation model.

(III) Metadata pertaining only to that particular end-user (e.g. end-user usage and analytics) will be collected by the OA Platform Operator (from the CF STB) and, when RSP-specific, shared only with that RSP. Thus the Connecting RSP may want to use this inbound data for business purposes. It is envisaged that the Connecting RSP in the thin implementation model may use this data in the manner presented, i.e. not process / convert the data for integration with its existing systems.

(IV) Metadata published to the service discovery engines (which are specific to the OA Platform) and available to all end-users e.g. (1) content description metadata including but not limited to program, title, synopsis, genre, rating, subtitles/ captioning, credit list, etc. and (2) instance description metadata such as

offer information. The Connecting RSP may supply richer metadata (e.g. coupons and preference sharing) to facilitate differentiation although the extent to which that is visible and actionable within the service discovery engines requires further analysis. In the thin implementation model, the content metadata edit suites and the content and instance description metadata servers may either be operated in-house by the Connecting RSP or run by the OA Platform Operator.

- (V) Advanced metadata to support within-content tagging available to application developers for interactivity. A licensing model may be required to expose this data.
 - (VI) Event logs that are within-service (e.g. analytics that pertain to end-user behaviour specific to an RSP's service) are envisaged to be for that RSP only and not for other parties (RSPs or the OA Platform Operator) unless it is appropriate to share such analytics with those other parties (e.g. for troubleshooting).
- (ii) For the convenience of end-users, the Connecting RSP should ensure that the metadata implemented on the OA Platform should be at least as rich as the metadata implemented on its existing systems.
- (g) CMS: While content management is especially important and elaborate for multi-channel and multi-content type RSPs, the Connecting RSP may already have a common CMS or multiple disparate CMSes, and it is the Connecting RSP's discretion how best to architect and implement a CMS for the OA Platform that integrates with its existing systems. In the thin implementation model, the OA Platform may offer a basic CMS as a value added service. The CMS's interfaces to encoders, metadata edit suites and other post-production capability (e.g. censoring and subtitling) is a matter for the Connecting RSP and the OA Platform Operator to agree upon. In any case, a CMS compliant to the metadata, middleware and SCP interfaces articulated in the OA Platform Reference Guidelines will be required. The ability for the Connecting RSP's existing CMS(es) to comply with the OA Platform Reference Guidelines will drive the effort of integration.
 - (h) Content Payout: In the thin implementation model, the preceding content processing functions such as encoding, metadata editing, encryption-

management may be accomplished by either the Connecting RSP or the OA Platform Operator, but it is assumed that the OA Platform Operator operates the video headend (which presumably includes video server, network interface cards (NICs) and outgoing load balancers) and thus content finally resides within the OA Platform for playout to the OA Platform's aggregation point. As the SCP's encryptors may reside in the OA Platform for use at playout and the SCP is tightly coupled with the middleware, including the SMS where purchase history is kept, the architecture of this solution may require integration of the playout system to the Connecting RSP's existing SMS.

- (i) Applications: The Connecting RSP shall support a common application and service environment in accordance with the OA Platform Reference Guidelines. The Connecting RSP can offer applications in either application stores or within the playout (e.g. "red button"). The Connecting RSP is responsible for maintaining its inventory of applications. In the thin implementation model, the hosting of the application store and the provision of environments where the applications are run may be provided by the OA Platform Operator. The operator of the application store and the developer are jointly responsible for qualifying that application for the basic CF STB at a minimum. It is expected that the application is signed by the developer or the Connecting RSP before placement in the application store. In summary, the applications in the store are curated by the Connecting RSP.
- (j) The following figure pictorially shows the major functions that the Connecting RSP is responsible for in the thin implementation model:

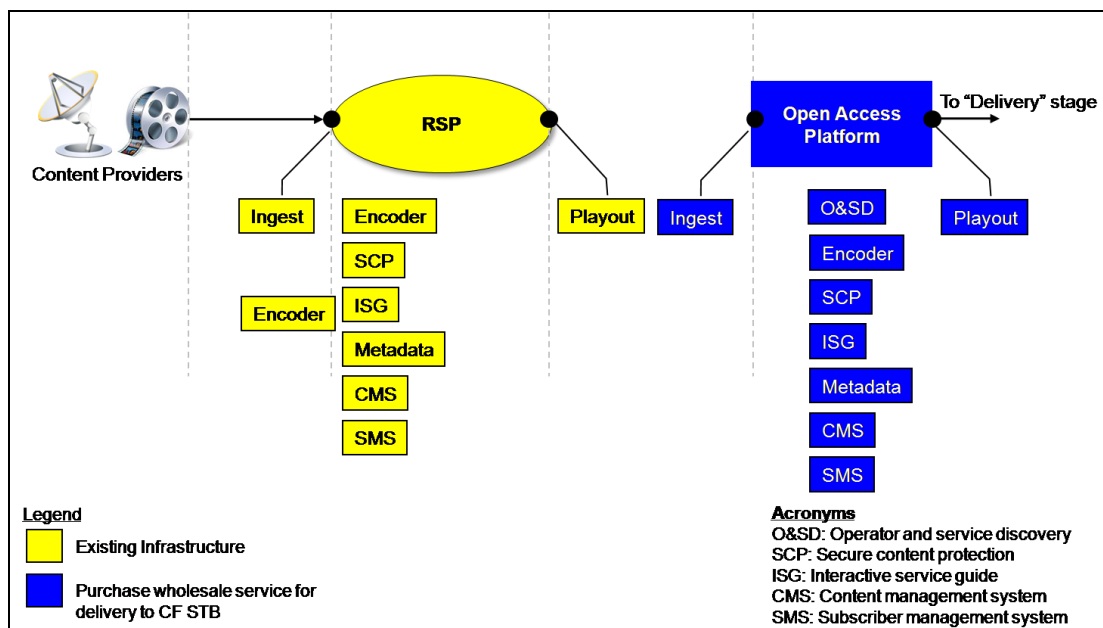


Figure 6 - Connecting RSP (Thin Implementation Model)

6.3.4 Delivery Stage

- (a) As a default operating model, the OA Platform Operator is responsible for procuring and managing bandwidth used by RSPs delivering content and/or applications to the CF STBs.
- (b) The OA Platform Operator will procure bandwidth from at least one Operating Company providing wholesale bandwidth services on the Next Gen NBN. The OA Platform Operator's choice of Operating Company should allow the RSPs on the OA Platform to deliver to any residential end-user who requests a service.
- (c) In the thin implementation model, the service port which the OA Platform Operator makes available for the Connecting RSP to deliver the Relevant Content to CF STBs is not required as the Relevant Content already resides within the OA Platform and is delivered from the OA Platform's playout system directly.
- (d) The Connecting RSP may propose alternative delivery models for consideration by IDA and MDA, provided that the alternative delivery model does not prejudice the achievement of the desired outcomes of the proposed "NIMS Connect" measure, as set out in this Consultation Paper.

6.3.5 Consumption Stage

- (a) **Specification:** The process by which the specification of the CF STB is reviewed and agreed for incorporation in the OA Platform Reference Guidelines is described earlier in Section 4.4.
- (b) **Conformance:** The OA Platform Operator shall establish a conformance regime where the OA Platform Reference Guidelines are published, vendors (STB/CE manufacturers and/or RSPs) submit devices for approval, and the OA Platform Operator indicates the device's conformance to the OA Platform Reference Guidelines. While all devices intended to be deployed on the OA Platform require approval, the conformance regime shall cover the CF STB's conformance with the Basic Features set out in the OA Platform Reference Guidelines. The testing of RSP-Specific Features by the OA Platform Operator is limited to ensuring that those additional functionalities do not adversely

affect the OA Platform and/or the Next Gen NBN. A methodology is required to maintain the OA Platform Reference Guidelines by industry dialogue.

- (c) Provision and Ownership: As the default operating model, it is envisaged that the CF STB within the Relevant End-User's premise has been procured from and is owned by an existing RSP. The default operating model also assumes the existing RSP is responsible for the maintenance of the CF STB, as described in Section 6.3.5(g) below.
- (d) Installation: The existing RSP will, upon the request of the Relevant End-User, arrange for the delivery, installation, and end-user checkout of the CF STB and that existing RSP's service.
- (e) Authentication: As described briefly in the SCP section, the OA Platform maintains a device management system and is responsible for authenticating the CF STB. When a device is connected to the Next Gen NBN and initiates a discovery request, the OA Platform Operator shall check that the device is an approved device prior to the presentation of potential operators and/or services. The OA Platform shall keep an updated profile of all devices connected to the system and periodically check all connected devices against the current minimum baseline of standard-compliance. The OA Platform should deny service to devices which are within the minimum baseline of standard-compliance.
- (f) Service Discovery: The CF STB, as part of conformance to the OA Platform Reference Guidelines, should have been configured to seek an operator and service discovery server, through a "burned in" IP address, URL or any other means of addressing.
- (g) Maintenance: For the CF STB, once it has been installed, the following maintenance tasks are envisaged:
 - (i) Performance monitoring: Event logs that pertain to the CF STB (e.g. hardware, software, network-related), should be collected by the RSP which provided the CF STB and, to the extent appropriate, shared (without fee) with the OA Platform Operator who may in turn share it with other RSPs whose service(s) are consumed on that same CF STB.

- (ii) Troubleshooting: If the end-user requests assistance, the existing RSP shall provide first level support. It is envisaged that the existing RSP will provide a technical help-desk style of support that logs the call and performs scripted clarification of the problem. The outcome of the existing RSP's troubleshooting is either problem solved or problem determined to be the OA Platform (and case logged with the OA Platform Operator), or resulting in on-site assistance including for example hardware repair or replacement. It is envisaged that the OA Platform Operator facilitates cross-RSP troubleshooting, should the need arise.
 - (iii) Hardware repair/ replacement: As a result of troubleshooting, either the existing RSP or the OA Platform Operator will determine the need to repair or replace a CF STB. The existing RSP, as the owner of the CF STB, should be responsible for on-site troubleshooting at the end-user's household should the need arise.
 - (iv) Upgrade of software: Any software update (including but not limited to firmware, operating system, IPTV or OTT client applications, plug-in features, drivers, interactive applications, etc.) must be approved by the OA Platform Operator prior to release to the field (whether that CF STB is deployed or in inventory).
- (h) Relevant Content: With respect to the consumption of the Relevant Content, it is envisioned that the following principles would apply:
- (i) The Relevant Content is offered through the CF STB, and the CF STB is validated for conformance with the OA Platform Reference Guidelines before installation by the existing RSP.
 - (ii) The Relevant Content is licensed and offered by the Connecting RSP to the Relevant End-User. The Connecting RSP is responsible for the quality of the Relevant Content.
 - (iii) The Connecting RSP owns the retail business relationship with the Relevant End-User, and is responsible for billing and collection.

6.3.6 Obligations

- (a) There are a number of business obligations associated with delivery of the Relevant Content by the Connecting RSP through the CF STB, including but

not limited to compliance to the OA Platform Reference Guidelines, commercial relationships with content providers and/or distributors, end-user contracts, usage of the RSP portal and purchasing bandwidth management services from the OA Platform Operator.

- (b) Additionally, in the thin implementation model the Connecting RSP will need to determine the exact scope of services to outsource to the OA Platform Operator, where such services could include hosted video or application processing equipment (on either a dedicated or per-per-use) or professional services. Service-level agreements and clear delineation of responsibility (e.g. video quality), latency, availability will also need to be understood.
- (c) In particular, the Connecting RSP has the following obligations:
 - (i) If appropriate, extend (or acquire) licence rights for distribution of the Relevant Content through the CF STB as described earlier.
 - (ii) Comply with the OA Platform Reference Guidelines. Depending on the implementation model chosen by the Connecting RSP, this may mean a re-use of parts of its existing system or little re-use with the non-reused systems either procured itself or procured from the OA Platform Operator. In all cases, a fundamental requirement on the Connecting RSP is to support operator and service discovery and list itself in that system so that the Relevant End-User can take-up its Relevant Content through the CF STB.
 - (iii) Procure the necessary bandwidth for the delivery of the Relevant Content to the CF STB from the OA Platform Operator as described in Section 6.3.4.
 - (iv) The Connecting RSP will maintain the retail business relationship with the Relevant End-User with respect to the Relevant Content as described in Section 6.3.5.

7. REQUEST FOR COMMENTS

7.1 Submission of View and Comments

- 7.1.1 All views and comments on the matters discussed in this Consultation Paper should be submitted in writing in both hard and soft copies (Microsoft Word Format), and should reach IDA by 12 noon, 22 September 2011. Respondents are required to

include their personal or company particulars, correspondence address, contact number and email address in their submissions.

7.1.2 IDA and MDA 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 annex to the comments raised. IDA and MDA will take this into account in their review.

7.1.3 All comments should be addressed to:

Patrick Pang
Deputy Director (NGN Programmes Office)
Infocomm Development Authority of Singapore
10 Pasir Panjang Road
#10-01 Mapletree Business City
Singapore 117438

Please submit your softcopy via e-mail to broadband@ida.gov.sg and hardcopy to address above.

7.2 Clarifications about this Consultation Paper

7.2.1 Respondents can direct clarifications or queries to broadband@ida.gov.sg by 12 noon, 7 September 2011. To facilitate a prompt response by IDA and MDA, respondents are requested to send their clarification emails with the subject header – “Clarifications on Industry Consultation on NIMS Connect Measure”.