

Industry Efforts of NIMS Standard

Executive Overview

This document expresses IBM's viewpoint on the what, why and wherefores of the CF STB, NIMS' Standards adoption and various issues such as the Mandatory Cross-carriage measure recently instituted by the MDA.

IBM does not believe the basic concept should be for consumers to select a specific RSP to service them, but rather for NIMS to provide cloud-based standards to allow an open access environment to for consumers to select channels or specific content based on an à la carte purchase, subscriber model. This would mean that standards and common features would be very important, but they would best be served on a cloud than on a STB. It is clear that three items must be available in the household, but could best be achieved with a few specific additions to a Common Featured and Standard Broadband modem: 1) Content Protection Stack with private keys locked to the hardware root of trust for the device; 2) Interaction device standard with Common Featured Remote; 3) HD/3D TV delivery standard with channel selection standard for the inbuilt TV decoders.

IBM believes the most valued approach by NIMS will be to take the pressure off of the issues around the CF STB via standardisation is to identify some specific standards which would, if mandated, achieve the primary NIMS goals effectively and with costs controlled for all but the two current PayTV RSPs. The required standards would only be these:

- **Full-video Standard for HD, 3D and SD TV encoding**
- A beneficial area of standardisation to avoid the outcome of a world with PAL, Secam and NTSC will be setting government dictated "guidelines" for the use of primary video encoding standards by device: SD TV, HD TV, 3D TV, web browsers, etc. For Video encoding standard to include support for 3D (any of today's de facto standards for web will suffice)
- **TV-level browser to display on legacy TVs during the replacement market period**

TV-level browser standards would be used to display on legacy TVs during the replacement market period while be transition to IP ready TVs for the full Over the Top (OTT) approach. The only fundamental impediment to using the OTT approach for home TV and VoD is the availability of a mini-STB to carry a high-performing TV Web-like browser. Given similar low-impact browsers such as Opera, it is deemed the most valuable in-home and on STB standard for the Singapore government to mandate and support with be the TV browser. This will open the door for common widgets, application storefronts on the cloud, a la carte programming and content purchase rather than locked in SuperRSP or legacy STB RSP constraints. The browser will also be the locus of interactivity, local user GUI Widgets/mash-ups and can easily replace such back-ward looking approaches as we see with WidgetTV for device-local, device-dependant content and application provision schemes.

- **Content Protection standard across all content forms and formats**

This Content Protection scheme (As known to NIMS as CA/DRM, but better called Broadcast Encryption) is to be used for all TV content, movies/TV entertainment, T-government services, multi-use license authorisation, UGC, music, games and applications. There is a market shift towards consumers getting their content from "Over the top" sources; at this time in History, Singapore should assume that as the standard marketplace approach and allow the two current STB provisioning suppliers in Singapore run a long tail with the concept of STBs and effectively replace this approach by adding three functions to a Common Featured Broadband Modem

The NIMS CF STB would have five primary purposes, which can be largely replaced by services and standards supplied on a shared cloud for Singapore:

Channel Switching and Remote-controlled interactivity

Some contemporary mobile phones have the power to perform this function, but some form of local wireless interface will be required. Consumers will continue to use some form of local handheld device to control selection and screen interaction on the primary living room display device such as TV until gesture based receivers become the norm in 7-10 years.

CA/DRM Decryption and Provisioning

This is also a thing of the past when key-based AACS compliant content protection standards exist. The ability to generate, provide and revoke keys based on a national identity scheme is all that is required and therefore a standard for Broadcast encryption and content protection is all that is required to deal with the question of legacy STBs and their reliance on CA which is one of the primary functions of the STB (and any smartcard readers as required in some geographies).

EPG/Widgets/UI and video overlays

EPG and TV Widgets can all be supplied via cloud services locally to households under Next Gen NBN without video overlays if a Common Featured and standard TV browser is mandated and successfully implemented by NIMS.

Decoding the video standards or IPTV Standard

The video decoder for standards would be supplied as reader/viewers added to TV Browser in the standard NIMS CF STB or NIMS CF TV browser.

Providing multiple forms of video output connectors

With the realities of hardware dependant cables and connectors, this is one feature that only cables or mini-STBs can provide. From RF antennae style connectors to S-video to HDMI, the Consumer electronics suppliers and household consumer have been dealing with this issue on their own for many decades. There are already home entertainment consulting and service specialist companies and we recommend that they are important members of the ecosystem and no form of standardisation here should be mandated that could hurt their business.

PVR capabilities

IBM believes that all of these capabilities with the exception of the First three can be done from a cloud and outside the household thus reducing the cost, sophistication and much of the need of the CF STB requirements.

Current RSP Adoption issues

StarHub and SingTel will not necessarily follow the same path as other RSPs because they have legacy solutions to support so they require a smooth and costless transition from their current state to the new standards based state.

Overview

CA/DRM will be replaced by Broadcast Encryption

As IBM has indicated often, conventional approaches to CA will not survive. More importantly, the current commonplace DRMs not sufficiently secure nor based on an externally exposed hardware root of trust will also not survive as they are inherently hackable. We have also found the public exposure and the fragility of open DRM approaches such as Marlin is hackable. We therefore suggest that one common standard to Broadcast Encryption for IPTV and all home media content protection be mandated for Singapore to achieve the mission of Singapore as "a Trusted Global Capital for Digital Media". The qualities of this standard are quite simply full support by the entertainment leading companies of the world such as Warner Bros, Disney, NBCU. We suggest that NIMS could mandate a Broadcast encryption that is already supported as a content protection standard in the global entertainment industry that works for streaming, removable media (DVD, SD cards, Blu-ray disks), IP based wireless networks, downloadable home entertainment formats, music and all media/application/healthcare type files

Content will be on a per asset basis not a per RSP Basis

Content will need to become a pay as you use or buy outright model as it has with music and home entertainment media for movies. The notion of subscriptions to a bundle of channels will become a thing of the past in no more than 5 years. While easy, this model does not work for places such as Singapore with limited provision of highly valued content such as the EPL. As witnessed by EPL, though the cross-carriage requirement will reduce this problem for the consumer, it will negatively impact the commercial success of RSPs. The only strategy to solve this will be the necessary alternative around bundled subscription packages -- ergo a "à la carte" format.

Content will be paid à la carte as well as by Subscription

In the intervening five years the dual commercial reality will exist. The aficionados of the Over the Top (OTT) approach will be the first to approach buying just the content that they want and need. The desire will be for VoD whether live or latent and as the transition to OTT occurs during the next 5 years, many early adopters will stop their subscriptions to channel bundles as increasing witnessed in developed Western countries where consumers are responding to the GFC by buying content in discrete packages as they want it and when it is old enough to be at reduced value (such as remaindered DVDs in supermarkets, songs but not albums on iTunes and catch-up TV at websites such as HULU where the expensive TV programming is reduced quality, but ad free).

Content should be licensed cross-media device not for the STB alone

This is a recurrent theme. Movies, TV shows and music will evolve to being viewed or listened to on many devices from home entertainment centres to slate computers (such as iPads) to mobile handhelds (such as smartphones). The consumer will want to buy once (or rent for cross-media device). The day of buy the same movies on Pay per View, DVD and iTunes is gone. The consumer wants to buy once and play many and multi-device.

Standards will be dictated by the RSPs

The commercial marketplace dictates standards– if government can mandate common ones for Singapore, great, but the reality of marketplace freedom means that when certain standards are established they will be worked around by piracy, market dominance and lead to non-interoperability, monopolies and other commercial benefits by large enterprise. It will be the RSPs that drive the use of standards, so it is essential to find standards that minimise the impact to RSPs and advance their commercial interests.

Content Protection enables Quad-play success

In order to achieve the goal of Singapore as a Trusted Capital for Digital Media, a single, cross-media, cross-device approach to keying and licensing media should be established. This reduces the needs for a range of other standards including video TV encoding standards as those will need to be device independent and rendered for the local device in use.

Freedom for RSPs and Content owners to make new business models will be the immediate and logical result of a common standard for content protection. This will further enable the Creation of new Market Segments and facilitate the creation of Consumer choice by Extending Web access, commercial enterprise to focus on enhanced consumer experience and a seamless access to four or more screens.

Consolidated Answers as requested in the document

1: Cost Savings with a NIMS CF STB for IPTV RSPs

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2: Risks of Standards-based approach

It may be that IPTV standards are diffused rather than nascent. Selecting standards in this area can be reduced to looking at the three main household standards required for a world with or without STBs. These are, as stated in our introduction: 1) Interaction standard; 2) Broadcast Encryption and Content Protection Standard; 3) a TV-based web browser so interaction with the cloud is possible (and relying on (1) above for local interaction via remote controller).

SMPTE monitors the current developments in IPTV standards for their feasibility, benefits and risks. There is sufficient industry reporting on a standards-based approach for accelerating the development of a vibrant NIMS Ecosystem, but IBM asserts that standards generally do not accelerate the commercial development of solutions, but often make them last longer. In the case of an ecosystem of partners such as NIMS, the value of standardisation is to reduce their cost of interaction with the market and interoperability with partners and competitors (as is now required by the new cross-carriage requirement by MDA on 12 March 2010).

Finally, the standardisation of items such as decoders will reduce the cost of planning and delivery by RSPs.

3: Best proposed areas of standardisation will impact the way IPTV RSPs differentiate their NIMS CF STBs, for example by including optional features as a way to attract new subscribers. Would there be an increase in promotions offering free rental of NIMS CF STBs to encourage end-users to switch STBs?

In a word, yes. Rather than lowering the barrier to entrance for more, different STBs though, the concept of a CF STB is to promote cooperation in other areas and allow interoperability of non-valued parts of the service provision supply chain. To best reflect the opportunity, the focus should not be on the CF STB, but rather providing a cloud with the high value components of STBs such as PVR or On-demand video download and decoding. The features that can be implemented in a cloud outside the household can and should be mandated, supported and realised by the government mandates spoken of extensively throughout this document.

4: Will the current approach to standardisation in Singapore be applied to the Next Gen NBN, taking into consideration the open architecture of the Next Gen NBN

We agree with the IDA's assessment that there must be clarity on standards relating to the host layers of the network. These are the very standards that can be run over an IP-layer network to make all households peer clients on one big LAN in Singapore. The cloud as a host for the services that in the past were run on STBs should be the default approach to this solution. SO working down the list of CF STB features, prior to standardisation to the household STB, they should be reviewed to see if they can be provided and provisioned by the cloud in a public, but individually secure network.

5: Should the proposed standardisation efforts be focused on the IPTV RSPs operating on the Next Gen NBN and/or should the proposed standardisation approach similarly apply to future network infrastructure?

While standards have a half-life of less than 8 years typically, the efforts for standardisation should likely apply to all network aspects in the future. There is a thin and vanishing line between computer network and media network. The standards will apply from the lowest to the highest layers ultimately. The Singapore government must pick their poisons carefully so that the standardisation efforts do feed the common good of the valued companies, the major global content providers and the residents of Singapore.

6: Is the timeline for achieving "the Immediate Goal" beneficial to the implementation plans for IPTV RSPs

We believe that with a modern content protection scheme, the intermediate goal to prevent household from using the same CF STB for multiple RSP provision is a short-sighted and non-functional goal. It would be better invested in making a unique, unshared mater key program where citizens of Singapore can key-match their identity or purchase tools (like a PayPal account) to an agreed content protection standard. The evolution in the long-term to the a la carte content purchasing model will dictate the way consumers behave and, consequently, having CF STBs that only allow one RSP to provision them to a household is reductive and counter-intuitive to the market value.

7: Ways to achieve adoption of IPTV Standards in Singapore

This will only be done by mandate as we would guess is the case with other government approaches such as cross-carriage requirements. As we state, standards are good for the consumers and the vision of an ecosystem, but they are not commensurately good for the large commercial enterprise, they are not adopted.

8: The feasibility and the benefits and risks of issuing an outcome-based direction

8a: How could such risks be mitigated and/or avoided?

This outcome-based direction will be the necessary outcome if no standards are mandated.

8b: Will the inability to capture all players in the NIMS Ecosystem with the outcome-based direction pose a significant problem?

It is not necessary to capture all ecosystem players, but rather make sure the major ones are interoperable and reduce the amount of duplication of non-functional efforts to be imposed by the major players such as SuperRSPs or the two existing RSPs. With outcomes as suggested for NIMS, the best measures to achieve will be agile extensibility of any standards imposed, mandated or opted-in – if the outcome based approach is taken, the commercially strong will excel and this should be avoided if Singapore is serious about making the ecosystem for NIMS rich, vibrant and potentially globally focussed on leadership as a trusted content development, production and delivery hub in Singapore.

9: The possibility, the benefits and risks of adopting the industry opt-in approach.

9a: What factors which would encourage industry players to opt-in?

Industry player would be more prone to opt-in if the government tendered for a single organisation to commercially own and control the STB and content protection scheme to take those non-functional activities and services out of the hands of the RSPs who currently use them as a mistaken commercial advantage.

9b: Why major IPTV RSPs (SingTel and StarHub) will prefer not to adopt the recommended standards. How can these risks be avoided?

The best way to avoid this lack of adoption will be to fund the availability of the CF STB that carries the standards for video encoding, DRM/Content Protection and interaction by remote controller.

10 and 11: The benefits and risks of prescribing the standards for IPTV services over the Next Gen NBN and a CF STB functional specification for NIMS

10a/11a: The approach to mandate adoption of standards based on the basic functions and the technical specifications which will be applied to the NIMS CF STB

We believe that the mandating of standards is the sole way to assure their adoption. Some considerations concerning adoption of standards will not be embraced by the industry, so it will require government mandates rather than voluntary adoption. When the decision is for opt-in or adhere to a standard, then a commercial decision wins. Therefore, when it is a commercial decision for the individual commercial enterprise, then the standard adherence rarely wins. Thus, we submit standards must be imposed by the governing bodies such as the MDA. With the global adoption of standards in the home entertainment industry, as we have mentioned in the past, such standards as DECE, DLNA, HANA, AACs, and emerging standards for interaction Digital Rights lockers, Interactivity and vide encoding will necessarily need to be mandated by the government.

10b/11b: What would be the likely costs of implementing these standardised basic functions?

This is far too general a question to be answered effectively. There would be real cost mitigation if the government supported a few basic areas such as publically available and reduced cost CF STBs or mini-STBs (remote control, content protection processor and video transcoders to common devices such as legacy TVs for SD and RF input. The cost of infrastructure and customer care provisioning could be reduced if the government supplied a very minimal set mini-STB added to the broadband modem or any wired/wireless connection device to the household. The presumed cost would be \$S12-14 per device if it includes a standard remote controller. The video transcoder would be one chip, the trusted root hardware processor for the DRM/Content Protection protocol stack and firmware would be one chip and the IR/LED interaction controller would be another component plus the required power supply and two or three cables/power cord (or battery compartment).

10c/11c: If an operator already owns infrastructure, how much of the existing components are likely to be reusable?

The existing infrastructure for currently owned infrastructure can be divided into two categories: STBs themselves and the full customer provisioning and care service solutions. In the case of SingTel's more recent and truly IPTV-based STBs they could use virtually their entire existing infrastructure with modifications including new firmware for the STBs. The IPTV video head-end would require more alteration for supporting video transcoding software/hardware, but would be a manageable addition. StarHub already has plans for the addition of a new IPTV head-end and therefore depending at what stage the new standards and CF STB features are mandated will be able to use more or less of this existing infrastructure. Their current customer care and billing infrastructure can be upgraded to meet the new standards, but the existing STB would have to at very least require a video decoding and CA retrofit and it is doubtful that the value of the remaining STB would merit partial retrofit rather than full box replacement.

12: The scenarios in which IPTV RSPs will seek waivers from parts or all of the Mandated Standards

Needless to say, StarHub and SingTel will seek waivers on all aspects of government mandated standards whether concerning video standards, CA/DRM standards or interaction standards so they do not need to replace, upgrade or add support for their existing infrastructure with anything new. On the other hand, most other RSPs will only seek waivers for their existing video encoding, possible current DRMs (as they will need to pay for any added content protection schemes particularly if government mandated ones) and STB/remote controller standards for interactivity in the event that they already have a pre-established selection in this category.

13: Additional Industry Efforts for Growth

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