

Competitive Navigation System Interoperability

Proponents of the “Competitive Navigation System” as discussed in Part III of the WG4 Report provide this material for reference at the August 4 DSTAC meeting, as solicited by FCC staff, in preparation for and aid of the discussion of interoperability between and among WG3 and WG4 proposals.¹

The Competitive Navigation System proponents provide this additional information in response to comments made by proponents of the “Application-Based Service”:

- *The Device Proposal restricts HTTP to the transport of video and descriptive metadata, stripping the original and main purpose of HTTP - delivery of full web pages and web app.*

The use of HTTP to deliver video and metadata is commonplace and not at all against the intent of HTTP. The competitive proposal is pointing to the existing dominant usage of HTTP as the modern method for delivering unicast video content. YouTube, Apple TV, Netflix, Sling.tv and millions of other content platforms on the Internet use HTTP as transport of video and metadata and not merely for web pages and web apps. The RVU, VidiPath and the DTCP-IP content protection system also use HTTP as the delivery method for delivery of video without web pages.

- *... through an expanded CableCARD MMI that is yet to be invented. The CableCARD MMI does not define how a hyperlink is navigated and selected.*

The CableCARD specification intentionally left implementation details of the navigation of hyperlinks up to the consumer device manufacturer, because that is consistent with how hyperlinks are used in the Internet paradigm. Hypertext and hyperlinks are *intentionally* defined separately from the browser or other technology that navigates them to allow both sides of the interface to be flexible and extensible. Defining them would have limited both the cable operator and the device manufacturer. This has always been part of the implementation in the client side browser/renderer. Just as VidiPath and other HTML5 UIs used by MVPDs provide hyperlinks to client devices, nothing is preventing using those same techniques in HTML content presented through the MMI.

- *Unlike the application environment we see today, the CableCARD has no provision for JavaScript or other application execution environment in the Host device on the other side of the CableCARD interface. An MMI has to have an execution environment in the client to provide any form of interactivity, or it fails. But the Device Proposal provides for no execution environment within which the widgets delivered through the MMI can operate.*

and

¹ The bulk of this material was prepared for inclusion in the WG4 Report but could not be included without inordinate extension of deadlines for comment upon it. Responses are based on draft criticisms, primarily direct quotations, the language of which may have been modified in final WG4 Report editing.

- *Offers no reason why existing specifications like HTML5, EME, MSE and Web Crypto, all developed through the W3C open standards processes, would not be a more appropriate solution, as proposed in the MVPD WG3 and WG4 proposals. Instead, it would require essentially starting from scratch*

The “MVPD” analysis is confusing the reference to the older CableCARD MMI with the actual proposal of a new MMI interface. Yes, the CableCARD MMI (which was defined almost 20 years ago) did not have modern technologies like Javascript, but the proposal does not exclude them. Indeed the proposal envisions the use of technologies like HTML5, EME, MSE and Web Crypto for user interaction “widgets” over the MMI as this would give both MVPDs and consumer device UIs flexibility for innovation.

- *Ignores the app-based model that has been widely deployed in the marketplace. *** It removes any APIs and fails to provide an application execution environment, with the expressed purpose of stripping out features of MVPD service. The mobile app platforms provide a predictable execution environment on the client and the application developer can evolve their client apps along with their server functionality without the need to negotiate with a third-party when the client/server interfaces evolve. The retail proposal proposes to disintermediate or interfere with this time proven model, by removing a predictive execution environment and freezing the client/server protocols and interfaces.*

Again the analysis is incorrect in that the competitive proposal does not ignore the app-based model. The proposal states that it is an alternative which, unlike the app-model, actually meets the requirement to enable competitive navigation devices. As an alternative option for the consumer, it also does not prohibit competitive app-based solutions from the MVPD directly. In addition, there is no requirement for an application execution environment. On the contrary, the competitive proposal points out that previous application execution environments for pay television such as OCAP and DVB-MHP were failures because of both the technical complexity and competitive restrictions they placed on navigation devices.

The competitive model does offer a predictive execution environment for the widgets that are needed for implementation of certain features (such as PPV/VOD purchasing, VOD playback including LookBack and StartOver, service upgrades, billing, support relating to the MVPDs service, caller ID, sports scores, etc.) without requiring the added complexity of requiring an execution environment for content delivery. HTML5 is the nearly universal choice for user interaction (as opposed to the prevalent use of HTTP and not HTML5 for content delivery). While the consumer could choose to use an MVPD provided app that reflects the entire MVPD UI (as required in VidiPath), in order to enable competitive navigation UIs the MVPD would provide the Service Interfaces defined in the competitive proposal, and can still optionally offer subsets of the MVPD UI that reflect the various widget components mentioned above.

The competitive proposal strikes the proper balance of implementing an execution environment for what it is good at -- without requiring it for access to content and therefore restricting or preventing a competitive UI. Through this correct, balanced, use of an execution environment, competitive devices would have freedom to innovate on the UI and utilize widgets in the contexts where they are needed to interface with the particulars of a given MVPDs service. Mandating an execution environment for

the MVPD application as the only platform for access to service as was attempted and failed in OCAP would only limit innovation and the marketplace.

- *The Device Proposal strips out the very features with which MVPDs compete, improve service and market to consumers, on every retail device envisioned by the proposal. Satellite customers would lose sports scores and statistics for satellite. U-Verse customers would lose instant channel change. Cable customers would lose StartOver and LookBack, telescoped and interactive advertising. Cable program networks would lose the interactive enhancements they have built into their programming, such as shop by remote and multiple camera angles.*

The basis of competition is differentiation and choice. It is incorrect to assert that because a competitor does not include the same feature set of its competitor it has stripped those features. The market will decide which option it prefers. Furthermore, some of the features listed would not be removed in either proposal. The features can be supported in either model. For example in its implementation of the Content Delivery Interface of the Competitive Proposal, U-Verse would implement fast channel change in the interface. The competitive device would request a channel, and the U-Verse interface implementation would perform whatever proprietary protocol is required for fast channel change. U-Verse would do the same in a VidiPath or App-model approach. In both proposals the receiving device does not implement fast channel change, but it is still available to all navigation devices. The same applies to features such as advertising insertion, telescoped ads, switched digital channels, and many more that are network or system specific features. In addition, the abstraction (not stripping as claimed) from network specific technologies that both proposals use gives MVPDs more freedom to make changes to their network technologies. Vidipath clients for example would make the same request for a channel change regardless of how U-Verse implements fast channel change. If they change that technology within their network, the clients would not need to change.

Finally, many of these so-called 'losses' can be covered by the HTML5 widget model explained above. The explosive innovation that will be precipitated by an open, competitive market for navigation devices and navigation UIs would overwhelm whatever disadvantage is attributed to these so-called 'losses'.

- *The Service Discovery Interface is limited to three elements: lists of available services; metadata about those services; and messaging from the MVPD relating to these services. The metadata and messaging related to these services significantly constrain innovation. The metadata in this interface is limited to describing the service, but does not permit any method of enhancing the service itself (e.g. interactive enhancements, multiple camera angles, request for information, telescoping ads, shop-by-remote etc.).*

By focusing on the number and not the breadth and functionality of interfaces this argument ignores the fact that the interfaces are based on extensible web protocols, the basis for most Internet services which have proven they support rapid innovation. The internet has been built on such extensible technologies. In the competitive proposal services can be enhanced and new ones added without constraining the client device into running a complete MVPD UI. Extensible protocols such as XML allow client devices to ignore elements they don't support (or choose not to support) and thus new

features can be added easily. The standards, protocols, APIs, and interfaces that will eventually be finalized for allowing creation of a competitive navigation device should also include extensible technologies as well where relevant.

- *Interactive enhancements to the content are not addressed or envisioned in this proposal. Nor is there a process identified for how any of these interfaces would evolve over time, in order to phase out obsolete technologies/features and introduce new technologies/features.*

On the contrary, the competitive proposal distinctly includes interactive enhancements and MVPD-unique elements via the MMI to enable this. Interactive enhancements from the MVPD can easily be achieved by the MMI widget model. Beyond that, the implementers' competitive navigation devices will be able to create their own interactive enhancements that to date have lacked any vehicle for delivery to consumers. Final specifications may include methodologies for phasing out obsolete technologies over time and use extensible technologies for expansion of future capabilities.

- *There is no indication of how modern business models could be expressed if the only interface from an in-home device is DTCP. The proposal provides much more detail about device authentication through the use of X.509 certificates, yet fails to provide the critical and necessary details about how these certificates are managed, the required trust infrastructure, certification, and any policies necessary to make the certificates useful.*

DTCP, which is also specified in VidiPath, is not a static specification without improvements. Future versions of DTCP currently in development could satisfy both the CCI and format requirements of modern business models. Specifics on aspects relating to entitlements are not detailed at this point. These should reflect inputs from MVPDs in order to best interoperate with their services.

- *It identifies a number of protocols, but does not specify which would be the preferred embodiment. It invokes standards that are not implemented (e.g. SCTE 65 Profiles 4-6 and CEA 2033) or standards that are implemented only by some MVPDs (e.g, Zeroconf which implies a particular provision, management, and fault detection system in the MVPD's network.)*

The Competitive proposal at this point of discussion is not intended as a completely detailed protocol at every level. It is consistent "with the Commission's instruction to recommend an approach that would allow consumer electronics manufactures to build devices with competitive interfaces."² It outlines the features and recommended technical interfaces required in order to create a retail market for competitive navigation devices.

- *It does not even support linear channels within its own terms. It explicitly acknowledges reliance on "prosthetic" auxiliary devices for satellite and IPTV, at the very least – meaning more boxes (and more energy consumption).*

² See "Guidance Description" above.

The Competitive proposal includes content protection models similar to the content distribution and DRM/CAS solutions presented in the MVPDs App proposal. They both focus on IP delivery of content, either from ‘cloud to ground’ or from an in-home gateway device. The competitive proposal is an extension of technologies the MVPDs have already deployed and/or have presented to the FCC. None of this requires any radical rearchitecting of networks (indeed, it requires at worst only minor changes) because it involves software protocols from either the Cloud or in-home gateways, and not network hardware. As for the use of “auxiliary devices,” the operator has the option of implementing the interfaces in the cloud or in their existing gateway devices. In the VidiPath and RVU demonstrations a gateway is required as well. All MVPDs require these gateways today, either as cable modems, DSL modems, or fiber termination devices. It is completely possible to not require any new device for this competitive solution.

- *The Device Proposal supports advertising inserted at the network source into the linear channel, but not interactive requests for information, telescoping ads, or promotions. *** The Device Proposal does not provide the tools to support the advertising that funds the dual-revenue MVPD business, or to provide an interactive and accountable ad platform that can continue to compete for those ad revenues.*

Network-sourced ad insertion is the norm for both traditional MVPDs and OVDs. YouTube for example uses network-sourced ad insertion exclusively. Local insertion by the client is extremely rare, primarily in limited one-way systems as noted in the DBS section. Ad insertion for VOD (or any other content played back from an MVPD source directly, such as live linear TV, LookBack, StartOver, cloud recorded DVR) is almost entirely network-sourced today. In the competitive proposal MVPDs can implement novel interactive advertising models such as telescoping ads using an HTML5 playback widget that would have full control over ad insertion and audience measurement. This need not apply to recorded DVR content because for a retail DVR device built on this kind of system; if the content is played back after being recorded, it is then under the user’s full control and should not be subject to any service management by the MVPD.

- *The Device Proposal offers no support for EAS. EAS is delivered through a variety of means across MVPDs (e.g. in-band vs. out-of-band signaling, presentation differences, text crawl with audio override, forced tune, barker channel, etc.). Those differences can be abstracted through an application-based approach, but there is no indication that the EAS via MMI can be implemented across all MVPDs. In fact, if MMI display is only allowed as an option, EAS could not operate as intended.*

The fact that EAS is delivered through a variety of means across MVPDs was solved in the CableCARD case by abstracting the “variety of means” into a common protocol. The VidiPath and RVU section of the WG4 Report states that despite the “variety of means” for delivery of EAS, they abstract them to a common protocol (W3C’s Server Sent Events (SSE)) such that the VidiPath and RVU clients do not have to implement all of the different methods. The competitive proposal also proposes such a common protocol within the content delivery interface which transport content and associated metadata.

- *Cable operators provide parents the ability to block channels they consider offensive regardless of rating. The Device Proposal offers no support for parental controls, including device restrictions (e.g., by channel, rating, time-of-day, etc.).*

Cable and DBS systems deliver parental control information on their networks today, and the various user interface applications on set-tops and other devices provide tools to the user to block content and/or channels. Competitive navigation devices based on CableCARD provide these and additional tools to customers by using the parental control information delivered on the Cable plant and abstracted by the CableCARD. In the competitive proposal, parental Controls information is required as part of the metadata for programming coming from the MVPD, and the FCC already has such a regulatory requirement. With this information, retail devices will then be able to implement parental controls that comply with the regulatory requirements in their implementations . In the competitive proposal, navigation devices can continue to innovate on such features in the user interface to give consumers more choice in managing potentially offensive content. Users would not benefit from this innovation under the MVPD-app only proposal.

- *Even assuming many required inventions that are undescribed, the Device Proposal would support delivery of VOD, but not a robust verification and audit platform required for the delivery of VOD assets. It would not support EST, Start Over or Look Back.*

This is incorrect, these are covered with the HTML5 playback widget model over MMI for VOD/PPV purchasing, EST, StartOver and LookBack, etc. The content metadata could describe when things like StartOver and LookBack are available for certain pieces of content, and competitive devices that support those features could implement them.

- *The Device Proposal does not support dynamically locally-inserted pre-roll advertising or disabling fast forward during advertisements included with VOD content as is often required as a condition to offering certain content on an on-demand basis.*

This is incorrect. The competitive proposal supports delivery of content over IP in the same manner of most OVD solutions, which means advertising (pre, post and interstitial) is inserted in the network by manipulating the playlist of adaptive bitrate technologies such as HLS and DASH. This is how the vast majority of content is delivered and multiple advertising models are supported today on the Internet.

- *Since the Device Proposal intentionally prohibits the MVPD's user interface, there is no MVPD UI for interacting with the MVPD's experience.*

This is incorrect. Just as with CableCARD, the competitive proposal does not prohibit the MVPD's user interface. The MVPD remains free to compete with their own UI using VidiPath or other technology. Unlike with CableCARD there is no requirement for common reliance, the MVPD must merely provide the defined interfaces.

- *The Device Proposal proposes to reduce the MVPD UI to a small set of widgets. But the MMI or widget model envisioned is event driven from the MVPD side only. There is nothing that envisions a subscriber-initiated communication to the MVPD, such as upgrading or downgrading service, ordering technical assistance, subscriber profile changes, parental controls, or a subscriber paying a bill. The Device Proposal claims that HTML widgets are*

suitable for communicating with all backend systems, but nothing has been described that would assure that functionality across all systems.

Widgets are not just event driven from the MVPD side, but can also be presented as part of the available MVPD services. This allows competitive UIs to integrate them in context where desired. The MVPD analysis seems internally contradictory in asserting that the use of HTML does not “assure” functionality; HTML is the very basis of the MVPD “Application-Based Service” proposal.

- *The Device Proposal does not support remote management of tuning or of the account by a network-connected mobile device. It does not support user authentication (e.g. PIN and/or password entry). As detailed above, the Device Proposal does not support user-initiated management functions such as billing systems or a subscriber’s ability to upgrade service from the screen.*

This is incorrect. There is nothing in the proposal that would restrict remote management of a user’s system. There have been various systems over the years that have allowed remote management of DVRs/TVs without any involvement by MVPDs (Slingbox, SageTV, etc.). Utilizing the widget model allows for user initiated management functions to occur. Furthermore, many of the features were actually first enabled by competitive retail devices. They may not have been developed if a competitive ecosystem was not in place via CableCARD.

- *The Device Proposal also proposes to define an entirely new Public Key Infrastructure (PKI) from scratch. This is a non-trivial exercise. The proposal mentions X.509 certificates, yet stops short of providing the critical and necessary details about how these certificates are managed, the required trust infrastructure (issuance, injection, protection, propagating revocation lists and requirements to query CRLs), and any policies necessary to make the certificates useful (profile, fields and information).*

That the information is not completely defined does not imply that it requires definition of a whole new PKI. There is no reason to do that, and it would instead be developed leveraging existing standards and deployed systems in those areas. As was noted in the presentation to WG3 by NDS (Cisco), legacy conditional access systems used symmetric security keys which made it very important that keys be kept secret and thus a non-trivial exercise to set-up and share keys between vendors. PKI systems are based on asymmetric keys which are designed to allow keys to be shared and even openly published without compromising security.

- *The Virtual Headend proposal also does not propose any method by which copy control information (CCI) or any other content usage rights are transmitted or implemented by or carried through to the downstream outputs of the retail device.*

This is incorrect. The proposal specifically mentioned DTCP-IP which includes CCI information, and was approved by CableLabs as an approved digital output. If the content is being transported by DTCP-IP, then that will contain the CCI information that is enforced on the client device per the DTLA license requirements. If the content is being played back via an HTML5 widget, then CCI can be enforced in exactly the same way as it is under the ‘app’ model, using underlying CDM protection. To the extent necessary, DTCP may be expanded to carry other usage rights information..