

Smart(er) TV Data for Measurement Initiative



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Introduction

Objective

Smart TV data is a vital input for media measurement solutions as it provides a view of traditional television whose viewing is decreasing and newer over the top (OTT) viewing and activities whose viewing is increasing, has national representation, and scale of data to support advance buying and measurement insights.



Smart(er) TV Data for Measurement

CIMM Compilation of Presentation Slides and Project Artifacts

This project's objective is to assess the various options for enhancing the value of Smart TV data, identifying a range of practical initiatives that could materially improve the use of the data for measurement purposes and stand a reasonable prospect of being supported by a critical mass of industry stakeholders.

Program Design

This program was designed to take a flashlight to the data collection by and utilization of Smart TV data for measurement purposes. It followed an iterative process of discovery, feedback, re-evaluation, and socialization of the insights and recommendations. The goal is for CIMM teams or individual companies to further develop the ideas and a few of the solutions.

Stewardship and Contributors

CIMM Smart(er)TV Phases



It Takes a Village: Credits and Appreciation



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Stewardship of this initiative was provided by the CIMM Project Steering Committee which was drafted to represent the major buy-side and sell-side stakeholders, tenured technical advisors, recent practitioners, and CIMM.





Many companies graciously volunteered their time to discuss the issues, ideas, and opportunities to evolve measurement from Smart TVs. Overall, there were over 44 interviews and numerous feedback sessions among CIMM members, non-CIMM members and associations. The interviewees were selected to provide the perspectives of the Buyers, Sellers, Smart TV Makers, Measurement Companies, Technical Specialists, and Associations. This group is also referred to as the stakeholders. The interviews covered specific topics (A sample guide is in the appendix.) and were tailored to the specific company and speciality of the executives who sat for the session – some were more technical, some more strategic.

About this Document

This document is a compilation and representation of the research, opinions, and recommendations that came out of the Smart(er) TV Data for Measurement initiative. The primary research was completed in the second quarter of 2023 and shared with various working groups, advisors and committee members through the third quarter of 2023. The presentation of this information is owned by CIMM. It represents the best efforts to accurately summarize the Smart TV data for measurement issues, opinions, and contributions that were shared by all participants. There is no claim to the completeness and correctness of technical details, though concepts and details are shared to promote education, transparency and dialog. While included in full at the end of this document, separate documents are available for the watermark document, and a compilation of notes for each of the solution areas. The full set of slides are also available.



Program Summary

Stakeholder Asks



Most of the 44 interviews were an hour long, and participants passionately considered many topics. Looking back over all of the comments, five themes were the strongest. **1.** Smart TV data must be made to be interoperable in the industry as long as the advances allow for optionality. Smart TV data should not devolve to the lowest common denominator. It must move forward. 2. Everyone wants access to more data which is two-fold – more OEMs providing data for measurement and for more types of data, not just a limited collection of the ACR libraries. The additional types of data pointed at included ad serving, watermarks, in-stream data, channel change, HDMI inputs, volume/mute, navigation and search. 3. Many stakeholders want to get more transparency and validation of the methods that are used to collect the data. There is an opportunity to increase trust and acceptance of the data, and increase the perceived value of measurement that includes data from multiple OEMs. 4. The stakeholders want to see more follow-through on the ideas. Many interoperability issues and solutions were identified over a decade ago and there is a level of frustration and complacency due to the lack of progress. 5. If we are asking any stakeholder to do something different, there must be a return on the incremental effort. While not a very attractive statement, the most common and frank exchange was "What is in it for me?", aka the "WIIFM," sounds like whiff-em. It is critical to work with the

OEMs to ensure that incremental efforts for measurement do not impact existing revenue models. Ideally, more participation in measurement will give content providers and OEM's better inventory optimization and allow them to take new business. Buyers will likely need to tie investment to measurement requirements. Everyone agrees there needs to be some advantage (\$\$) to making changes.

Executive Summary

Interoperability across a fragmented media ecosystem can best be addressed if each party can work with common IDs. These would be a set of IDs that work together to define an impression and that can be reasonably accessed by any qualified stakeholder. The universal IDs serve as an anchor for the open watermarks and open metadata, and can provide basic universal bridges to proprietary, higher value data. The IDs cover the user (which would be a deviceID, a personID, and/or a householdID), a contentID (such as EIDR), an adID (such as Ad-ID), a disrtibutorID (perhaps EIDR's?), and an inventory owner ID. The inventory owner ID becomes important in the addressable realm and the alignment of the measurement with the addressable requirements offers a great WIIFM for the industry to coalesce around one common set of IDs. The open metadata concept would ensure that a basic set of data could be established for aggregation across the industry operating systems. Open watermarks represent the most critical discussion for our industry to coordinate today. There are multiple initiatives that are considering incomplete requirements. We need to ensure that each revenue-based watermark initiative results in compatible data for activation and measurement.

E	xecutive Summary		
1.	"Who" saw what, when, where can be efficiently aggregated and integrated across the fragmented Smart TV media ecosystem if a <u>common chain of identities</u> are established and shared	Watermarks	
	UserID (D-P-HH) – ContentID – AdID – Timestamp – ServiceID – DistributorID– InvOwnerID	IDs	
	- Serviced with accessible universal IDs, open metadata, and open watermarks		Metadata
2.	Stakeholders seek some commonality and validations across disparate OEM data collection techniques		
3.	We need to build business models and foster technical solutions that support the contribution of more device data for measurement	Н	IH ₁
4.	Continue to address identity and privacy issues		
	- Build best practices for the householding (HH) and personification (P) of device (D) data		
	 Build legal framework for the use of device data for measurement and targeted ad supported content 	D _n	P _n
1	Coalition for Innovation in Media Measurement, October 2023		

Stakeholders have asked to establish a set of common terminology, metric definitions, and to establish a testing environment to validate or learn how to calibrate measures across OEMs.

The biggest blocker for the syndication of data among OEMs is a clear financial benefit. Whether the data unlocks more ad spend, the activation of more addressable inventory, or direct data for revenue, CIMM members need to build that case with the stakeholders. Some CIMM members wondered whether the approach would be as an incentive (like a higher CPM) or a requirement (would hold back business without broader data participation).

The other major focus for the improvement of Smart TV data must be around better identity management that bridges households-devices-people. As there are CIMM programs already addressing identity and privacy, this area of solutions was not prioritized, though a few recommendations do surface in the deeper details.

Overview (link to written document)





Overall, about 20 solution areas were identified and put to vote on perceived value and achievability. The full list and details are included toward the end of this document.



The results of the voting buoyed universal watermarks, revenue models, identity, standards, and testing

Core Recommended Projects

These are the six core recommended projects. Out of the core solutions, there appeared to be some dependencies and sequencing in order for the value to be recognized. Therefore, they are presented in a specific order. Each project has more detail on a separate slide that follows.



It is not a surprising conclusion to recommend the adoption of standard technology and cross functional operational approaches to heal the extreme fragmentation of media and advertising delivery. CIMM has been working on this problem for nearly two decades, and the industry has had some success establishing some IDs, Ad-ID and EIDR, and getting them partially into the operational media ecosystem. The ATSC3 standard was adopted by the Consumer Electronics Association (OEM's association) which defines how these IDs can be transmitted by broadcasters and processed on smart TVs.

A – Open Watermark Consensus



- 1. Video and Audio standards
- 2. Content ID's (EIDR / ECID or custom like IRIS). Enhanced Content ID
- 3. Advertisement ID's (AD-ID / UCID). Universal Creative ID
- 4. Distributor ID's (EIDR ServiceID / other)
- 5. Programmers to insert final IDs defined by EIDR registry mirror, Distributor IDs using EIDR ServiceID, Advocate for EIDR/AD-ID
- 6. Facilitate discussions with OEM to support WM resolution and information distribution



However, the industry has not uniformly implemented the IDs or services, most likely because there is no perceived revenue associated with measurement and interoperability. Given this perspective, we recommend that the measurement requirements be aligned with the addressable ad insertion requirements, and work to get a more universal view of addressable requirements across the media ecosystem. We believe the universal approach is the watermark, which could definitively identify content, ads, and support traditional and dynamic ad insertion across the delivery media ecosystem.

We recommend convening a cross-industry summit to review the handful of initiatives and work to assemble the universal requirements and recommendations for the implementation of the watermarks across all devices and major value chain operations.

Later in this document there is a link to the watermark reference paper. This is a summary of various watermarks (and ACR fingerprinting) and technical pros and cons that several companies contributed to.

The second non-surprising recommendation is that there would be a great advantage to the industry if the smart TV manufacturers, and in particular, those who are tied to the advertising revenue models for measurement, addressability, and advertising research, routinely gathered to discuss ways to collaborate and accelerate the revenue-producing programs. This is because each OEM represents only a sliver of the homes, some media consumption behaviors, and a subset of advertising inventory. The advertising engine runs more efficiently if it can operate together. OEMs should be able to make more money if they create a universal backbone for ad delivery. The watermark standards are only one of these topics. Several of the following core projects presume that the OEMs can or would adopt some commonality over time.

B - OEM Alignment



Facilitate cross OEM discussions for, trade group representatives included as needed e.g. ATSC-3 & revenue model development

- 1. Alignment on ACR / FP methodology
 - a) Sampling areas and frequency
 - b) Match database & source (unified source for all)
 - c) WM extraction and reporting structure
- 2. Alignment on UE's published monthly
 - a) Sets sold or online
 - b) Sets opted in for ACR
 - c) Sets available for FAST insertion
 - d) Sets available for Dynamic/addressable
 - e) Sets in usage reporting sample (with identity)
 - f) Others...
- 3. Legal perspective on watermarks used for metrics collection.
- 4. ATSC-3 adoption
- 5. Define and propose revenue models to support data sharing



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Most of the recommendations identified in this initiative are opportunities for collaboration. This is a little more tactical in nature. In the current workflow, Extreme Reach acts as the dominant facilitator of (ad) creative trafficking in the US. They receive an ad from the post production house or agency, and they process the ad, traffic it to the various systems and in some cases provide more reporting services. As part of the processing, Extreme Reach inserts the required watermarks and attaches the detailed IDs to the creative.

C - Binding Identifiers to the Advertisements





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The recommendation is to require agreed to IDs and additional services that could more efficiently support the measurement ecosystem. For instance, this step could create a universal ad library, and have a universal process to create the measurement fingerprints and to have those fingerprints adorned with the correct Ad-ID. Approved industry providers would be able to use the FP library for greater coverage and accuracy of ad reporting. While the idea is to centralize the process, this could be achieved with any provider, or perhaps even attached to Ad-ID services. The goal is to drive interoperability and streamline accurate ad identification across all measurement and ad delivery.



Several of the issues with metadata that were identified by stakeholders could be addressed by replacing traditional approaches to metadata with AI/ML techniques. Comprehensive and accurate asrun schedules are challenging to secure for a variety of reasons - local variations, distributor variations, and even broadcast variations for live events, emergencies, mirror feeds and changes in the ads. The cost and access for some are purposefully prohibitive. The inability for everyone to use basic universal content classification prevents interoperability, injects inaccuracy and costs into the media ecosystem.



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There are two traditional ways for companies to get the schedules. They can get the national schedules directly from the programmers, or they can purchase the schedules from a number of service providers. The service providers set up monitoring stations (with techniques such as watermarks, fingerprints, or manual assignment) or contract a constant video feed and make schedules from that. Recently, companies have established machine learning algorithms and operations to build schedules, though no system is providing comprehensive and highly accurate schedules for local and smaller networks. Companies that specialize in tracking on demand video services automate traditional crawling and scraping techniques to build up the catalog of available content by provider. Even more recently, companies are pulling descriptive data directly from the stream or video screen.

If a singular source of comprehensive video is available, such as from CCR Media, AI techniques that recognize the interstitial black screens could automate the generation of accurate timestamp schedules for any linear delivery. Additional AI techniques can be trained to identify the content and retrieve the EIDR ID, and even identify the ads and to retrieve the Ad-ID. Rules to assign classifications, such as live, sporting event, content ratings, actors, etc can be universally agreed to and made as an open classification standard, or can fuel a service that can assign and provide a look up service. Similarly, algorithms that can assign ads to brands, product categories, and owners can be automated, or retrieve and integrate a taxonomy from another system.

We recommend that the CIMM content and ad working groups develop an open set of classification rules and perhaps fund a proof of concept from a willing company.

- Agree to the required format and classification logic for content and ads
 - Develop schedules from on-air video feeds using AI to identify the timestamps, content, commercial pods, commercial positions, and creative.
- 3 Match to registries for ads and content
- Generate the taxonomies using AI to classify the asset from agreed logic (assign sports, 4 content rating, genre and sub-genre, etc.)

Consider working with Ad-ID and EIDR or other organizations to establish a non-profit management of the metadata or just the logic that fuels the metadata.

F - Representative Sub Panel



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- 1. Establish a representative subset of households (HH)
- 2. OEMs supply data from all devices for each of the identified HHs
- 3. Report and manage panel monthly
- 4. Revenue stream for reporting



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There is a clear desire from the advertising community to understand the total reach and frequency of ad delivery and content consumption, ideally to a person. This has been elusive because no singular owner of data can measure all occurrences. The industry has struggled to design a measurement that spans the walled gardens by publisher, service, device, and application. While it might be challenging to convince OEMs to provide insight to all of their consumers, perhaps there is a program that could gather the data from each OEM for a specific list (subpanel) of households. The panel would be revenue generating, managed to certain compliance requirements, and equally open to qualified customers. The goal would be to fuel models for deduplicated reach, and be managed by an independent group. While the many details would need to be more fully developed, it is possible that groups like the JIC or companies like Conviva could also or alternatively forward the activity for the listed households. If there is a general measurement panel established by the VAB/ANA/TVB or other, the OEM subpanel would ideally include the list households.

G - Device Test Lab





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The last core program in these recommendations is the cross-OEM device test lab. The goal is to address the questions that stakeholders have about the similarity of the data generated by the different OEMs and techniques. The proposal is to develop an independent test lab that controls the generation of identical events, compares the data from the common meter and compares them to the OEM provided device data. The lab shares the individual comparison with the OEM, and advises on general benchmarks and variations across the whole set without publicly attributing specifics to each OEM, similar to other CIMM initiatives.

This idealized roadmap suggests a sequence of activities and swim lanes, starting with the highest priority in the upper left corner. There are some soft suggestions on what might happen in the subsequent quarters, as most of the projects begin with the drafting or assignment of a working group. These groups would craft the substantive project plans.



It bears repeating, a set of universal IDs is the core to improving measurement and advertising. These IDs are the foundation of watermarks and the bridge for metadata and addressable ad revenue. This CIMM Smart(er) TV Data initiative would be successful if the diverging programs and requirements could be considered and aligned to establish a universal approach for watermarks and IDs. This would fix the dominant source of the inaccurate or incomplete data that flows through the OEMs and into measurement and reporting.

The other programs, such as the open metadata and standards are relatively straight forward in the roadmap. They start with a definition phase and move to tactical considerations.

Three programs in the roadmap are not described in the Core 6. This is because they are more about building ideas and agreements. How can the revenue WIIFM be developed for the contribution of data from the OEMs for measurement, whether that be for the subpanel, nurturing of the ATSC3 data pools, and removing the app measurement prohibitions so that the gaps in measurement don't skew the perceived value of content or advertising exposure?

Advisors' Perspectives





This program was approached with the idea of a flashlight. Let's take a look into the causes of lower fidelity data that flows through the Smart TV measurement media ecosystem and highlight what CIMM members could do to improve the quality for measurement. Our advisors are passionate and technical practitioners in advertising research, operational delivery, and measurement. Their guidance, introductions, and reviews helped shaped the entire program. The initial recommendations may be disruptive to some workflows but intend to provide paths for broad participation and coalescence.

Project Team Experience and Reflections on this Program



Myles Parker, Consultant, Tech Lead

Engineering and Product roles with 605, Comscore, Kenzan, Dish Network, 3Com, United Technologies, Sumtech

- There is a lot of pain and frustration in the space. People very open to discussion and participation.
- Solutions to these problems were discussed a decade ago and no follow through means nothing was implemented and no change was seen.
- ATSC-3 can likely cause digital distribution models to explode and alignment now is key for the future.
- Different groups doing similar things differently (IAB, ATSC, OAR) and in some cases they cannot work simultaneously. TV OEMS are doing similar things individually where collaboration can actually save them all money.
- As a whole if folks worked together and pooled they could accomplish the same with lower costs. folks doing things differently causes confusion when interpreting results. Comparing apples to oranges.

Caroline Horner, Consultant, Project Lead

Product and Client Services leadership positions with 605, Comscore/Rentrak, GroupM, Dish Network, Organic, Bates

- There was wonderful participation across the members and nonmembers that we reached out to. Many people care, and most don't know how they can affect change. Even when they have a plan, people acknowledge a lack of follow-through on all parts.
- Education about the measurement data ecosystem is needed.
- We need to bridge the digital-linear divide. It is even more fragmented than we thought it would be.
- Collaboration, cooperation, and coordination doesn't have to be the antithesis of making money. The walled-garden ecosystem is failing buyers, sellers and viewers.
- There needs to be a structure designed to coordinate the decisions that impact interoperability, no one is responsible.

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Project Artifacts

Background

Over the past two decades, the measurement of television has been increasingly tied to the data generated by the devices that provide access to or actually display video. These have been a range of internet (or phone or cable) connected devices, such as computers, set top boxes, specialty devices like Sling and Tivo, game consoles, and even mobile phones and tablets. Some newer devices (dongles or pucks) attach to televisions and enable access to live and on demand video content through a connection to the internet. All of these devices generate user data and many of the companies provide access to this return path data for commercial purposes. Many companies use return path data to quantify content and ad exposures, and some have created measurement currency that incorporates this data.

The Shift to Streaming on Smart TVs has Happened







millions										
	2020	2021	2022	2023	2024	2025				
Gen Z (1997 – 2012)	43.9	46.9	49.6	52.2	54.9	56.1				
Millennial (1981 - 1996)	56.8	59.2	60.5	61.5	62.1	62.6				
Gen X (1965 - 1980)	50.0	51.0	51.0	51.0	50.8	50.5				
Baby boomer (1946 - 1964)	34.1	34.5	33.9	33.1	32.4	31.6				
Note: Individuals who use the Source: eMarketer, Sep 2021	TV at leas	t Once pei	r month							

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A smart TV, also known as a connected TV, is a traditional television set with <u>integrated</u> Internet and interactive Web 2.0 features, which allows users to stream music and videos, browse the internet, and view photos. Smart TVs are a technological convergence of computers, televisions, and digital media players. <u>Wikipedia</u>

Over the past 15 years, Smart TV's have become common. During this same time, paid tv that has been traditionally accessed through proprietary set top boxes, has been in decline. Streaming video over smart TVs and services that use the smart TV operating systems to present video have become dominant in the media and advertising ecosystem.

The consumer behavior has shifted to streaming over Smart TVs, and the use of device data for measurement should include this behavior. This data provides insight into less common behavior that cannot be efficiently measured by panels. However, only a few of the Smart TV manufactures (OEMs) sell behavioral data for commercial use cases, leaving a significant gap in the understanding of consumer behavior.

Smart TV data is under utilized for measurement for a variety of reasons and as a result, it is not well-understood.

Smart TV Data is Underutilized for Measurement

OEMs are participating in measurement programs in a limited manner

- Each use proprietary Automatic Content Recognition Audio and/or Video Fingerprints to generate measurement data
- · Some offer data from ad serving, streaming, and custom projects to support ad sales
- Legal prudence Opt-ins from customers

Each OEM holds a limited understanding of the household, members, and some viewing habits

- Expected Bias
 - 1.1 TV per household, with bigger brands usually in the living room
 - Some Smart TVs have MVPD applications that replace the traditional STB
 - The age of viewers that engage in CTV is younger
 - Nielsen's <u>letter</u> to clients smart tv data is not representative of smaller incidence behaviors
- · OTA viewing does not include non-broadband connected households and devices
- · Some popular apps prohibit measurement
- · Identity accuracy varies with data collection practices, matching and householding approaches



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Looking at the reasons for limited participation in measurement by the OEMs, there are two primary motivations. 1. Legal prudence. Privacy laws continue to evolve, and those who sell data have worked to confirm consumer permission for the use case through opt-ins or explicit disclosures. 2. Walled-garden perspective. Some believe the value of the data is greater with strategic use, that the competitive risk of the insights is too great, or are uncertain the revenue would justify the incremental overhead.



Data collection for measurement from Smart TVs has predominantly been from a technique called automatic content recognition, or ACR. This is a technique that makes a "fingerprint," a tiny sample of the video, as a reference and stores it in the



reference library database. Then, when the video is played on the consumer's Smart TV, the video is time stamped and sampled in a similar manner and is passed back to compare it to the reference library. If there is a match found in the library, then the description of the content or ad is attached to the timestamp, and with some additional logic the manufacturer determines what was being watched. This technique can use audio fingerprints only, video fingerprints only, or both. This technique can also be combined with others such as collecting watermarks, remote control or service changes. There are times when the matchback between the source fingerprint



and the collected fingerprint are inaccurate or unavailable. The challenge is that few manufacturers can afford to operate an ACR system that can identify all content and ads, and that there are technical differences between the ACR fingerprinting methodologies. This means that there are few opportunities to consolidate the operational costs across manufacturers.

Each OEM has a specific view of their devices, and for measurement purposes, have unquantified biases for what they represent. Each manufacturer has, on average, only one of the average 2.5 TVs per household. The location of the television in the household can only be inferred, and the more popular, feature-rich brands are generally in the living room. There are more sources of bias in the Smart TV device data that include the fact that some of the brands have special applications from paid tv providers (like cable operators) that serve to replace the set top box. This means the behavior is not proportionately representative. The age of the household is also much younger among Smart TV owners and users. For these and other reasons, our measurement developers and users must be cautioned. A single OEM's data is not representative and must be combined with other data and approaches for good measurement.

There are a few other items that must be acknowledged. The smart TV data, by definition, comes back through an internet connection. However, not all televisions are connected and the data that might seem like it represents purely broadcast behavior may not be – over the air without broadband connectivity. Another issue that stems from the walled-garden business strategies from the most popular streaming services is the prohibition from measurement for native applications. This means that there can be real incongruities between measurement collection from the various OTT devices and other non-OEM collection methodologies. The final area that is worth highlighting is identity. When identity is based on IP addresses, or data is combined with other sources, there can be a substantive degradation of identity fidelity.

These issues are not non-trivial, but they can be addressed with collaboration, the use of research best practices, and data science methodologies.



TECH INSIGHT – TV OEM's all use different methods and processes and sources for creating the content library that their ACR algorithms match to. They also have different methodology and processes for ACR to capture what is presented so nothing is consistent. What matches from Samsung may not match from VIzio. Some OEMs take snapshots of content every 5-10 seconds some take snapshots several times a second. Knowing what each is doing is desired, having equivalent measures is preferable. Questions were raised whether the ACR code can be common among TV OEM's, if a consolidated video source library could increase the breadth of coverage and provide efficiencies.

While there are biases that need to be addressed when using Smart TV data, the general consensus in the measurement community is that the data is extremely important and should be carefully integrated for better measurement.

OEM's use different definitions to state their reach depending the sales opportunity or measurement purpose. CIMM members would like published standard counts, e.g. monthly numbers of TVs in use, consumers opted-in for measurement, targeted ad insertion, and TVs per HH.





Smart TV data use in measurement is gaining momentum for Nielsen One and currency challengers, for activation, and for optimization use cases

Best practices

Incorporate multiple OEM brands

Use with other foundational data: Panel, STB+ACR (+streaming), Identity

However, there are concerns because the technical data collection is unique to each OEM, and there is limited knowledge of how the data and accuracy differ, and if it really matters for each measurement purpose



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More OEM participation in measurement will significantly improve the media ecosystem, and the data should be a part of the whole system that includes panels, set top boxes and identity systems.

Smart TV Data suffers from the same data issues present in other industry data sources which need to be solved. These include the use of incomplete or inaccurate linear programming schedules, inconsistent ids for content and ads, and incompatible classifications of content and ads. That being said, some additional steps can be taken now to better understand how the Smart TV data should be used and to improve how it could be used, specifically.

The importance of data that comes from directly from the Smart TVs is only going to grow. This is because the way Smart TVs capabilities are influencing the business models. With the capability to deliver addressable ads in their own inventory now enabling distributor's inventory, the divide between linear and digital is fading. The upcoming ATSC3 broadcast standard, that is primarily enabled by Smart TVs, has the potential to generate more data and revenue opportunities for several stakeholders. Coordination across stakeholders is needed to unlock the most value.

The Importance of Coordination is Growing



Traditional linear and digital video business models are merging on the Smart TV

- Dynamic ad insertion for distributor and OEM inventory
- NEXTGEN TV/ATSC3.0 Enables linear broadcasts feeds using Internet Protocol to engage internetdelivered services. By end of 2023, 75% of HHs will have access to ATSC3.

New technologies for measurement from the glass

- · Open video watermark standards
- AI/ML for automated video interpretation and classification – recognizes much more than fingerprints

Approaches to protect privacy and business strategies, Cleanrooms and other cleantech





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There are a few areas on the horizon worth noting for Smart TVs. The connected devices can evolve capabilities with software updates so new approaches can be more nimble. New watermarks, and machine learning may not have to wait for a new wave of TVs to work through the purchase cycle.

TECH INSIGHT – Watermarks (audio or video) are preferable to ACR for content detection because they are definitive. However, some implementations of watermarking cannot be used simultaneously (e.g. OAR and ATSC-3 335). Therefore, agreement and alignment from content providers, distributors, and consumption devices is needed so that all exposures can be captured and reported consistently.



TECH INSIGHT – The primary driver for the collection of usage data is for the ad sales models, to shed light on audiences for Dynamic Ad Insertion. ATSC-3 drives linear activity toward digital models and seriously needs to be considered how the digital and linear commingle in the measurement ecosystem. The data casting portion of ATSC-3 enables OTA services to be reported from other devices where content can be delivered e.g. Automobiles. The continued divergence and consumption of content outside of the home and on other devices stresses the importance of Identity and accurate mapping of the devices to each household.

Hypotheses and Solution Areas



These are the opportunities that stakeholders suggested or commented on during the interview process. This is a list generated from the compiled notes from the interviews, and the linked overview notes do not identify the stakeholders. Overall, constituents felt the interoperability initiatives would be the easiest to address, except for the open watermark. The more impactful programs intend to increase the amount of data that is available for use in measurement. This document has already described some of the core recommended projects, although very little time has been spent highlighting the future potential data generated using the ATSC3 standards. This program needs more attention to groom it for measurement uses. The biggest untapped potential, given that all new Smart TVs have this standard for the use of watermarks, fingerprints, and other measurement events for OTA and terrestrial delivery.



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The design of this program was to incorporate feedback cycles with CIMM advisors. This was expanded to the CIMM working groups and a larger group of expert advisors. These individuals were asked to provide feedback for participation in these programs, and a rating of the perceived value and effort. This was one of the grids used to collect votes.

Eval Grid

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Opportun	ity	Description	Advantages	Challenges	Effort by stakeholder	Hard Costs	Buy-in	Timing	Value	Industry Impact
#	Solution				H, M. L	><\$1mm, >\$5mm	Limited, Broad	><1yr, >2yrs	H, M. L	H, M. L
1.0	The best short term impact will be from driving foundational inter	<u>roperability</u> , v	vith overlap							
1.1	Terminology for published descriptive statistics				L	~0	Broad	Months	L, M	L
1.2	Definitions of common metrics				M, L	\$	Broad	Months	М	M, L
1.3	Cross-platform technical standards				н	\$\$	Challenges	1	М	М
1.3.1	Watermarks				н	\$\$\$	Challenges	2+	н	н
1.4	Disclosure of methodology				M, L	\$	Limited	1	М	Н
1.5	Cross-platform taxonomies for the categories of content and ads				м	\$\$	Challenges	1	М	М
1.6	Services or instruments that can support access to common libraries for content and ads, and schedules				м	\$\$	Limited	1	м	М
1.7	Identity graph system				M. L	\$\$. \$\$\$	Challenges	1.2	М	м
1.8	Cross OEM test lab				M, L	\$\$	Limited	6mo	M	M
2.0	Longer term and greatest impact will be to draw more data into use	for measureme	ent							
2.1	Additional types of data collection		-		н	\$\$\$	Limited	1	н	н
2.2	Change in app permissions				M, L	\$	Limited	6mo	Н	н
2.3	Subpanel				Н, М	\$\$	Limited	1	н	н
2.4	ATSC3				Н, М	\$\$\$	Limited	2	Н, М	М
2.5	Revenue – opportunities and buy-side incentives				н	\$	TBD	1	н	н
2.6	Clean tech programs (or below?)				M, L	\$\$, \$\$\$	Broad	1	Н, М	М
3.0	Measurement evolution requires consistent nurturing									
3.1	Education to align the industry on measurement issues				L	\$	TBD	1, 6mo	Н, М	M, L
3.2	Cross association coordination				м	\$	TBD	6mo	н	М

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This set of feedback is from the project technical advisors. They provided subjective values, but it is relevant because they are far more knowledgeable about the history of the problems and prior solutions.

Subjective Ranking by the Project Team and Advisors

	Solution	Solution Name	Viability	Time to Market	Impact3.2
٠	3.2	Cross association coordination	5	5	5
<u>illl</u>	3.3	Project administration	4	4	5
Sorted by Impact	1.7	Identity graph system	3	3	5
Viability and Time to	2.2	Change in app permissions	3	3	5
Market	2.5	Revenue - opportunities and but-side incentives	3	3	5
	3.5	Privacy POV	3	3	5
	2.6	Clean tech programs (or below?)	4	2	5
	2.3	Subpanel	2	2	5
	1.3.1 Watermarks	Watermarks	2	1	5
	1.3	Cross - platform technical standards	3	3	4
and what should	1.6	Services or instruments that can support access to common libraries for content and ads, and schedules	3	3	4
others?	2.1	Additional types of data collection	3	3	4
	2.4	ATSC3	3	2	4
	3.1	Education to align the industry on measurement issues	5	4	3
	1.2	Definitions of common metrics	4	4	3
	1.4	Disclosure of methodology	4	4	3
\sim	1.5	Cross - platform taxonomies for the categories of content and ads	4	4	3
Which ones are in	1.8	Cross OEM test lab	4	3	3
process?	1.1	Terminology for published descriptive statistics	5	5	1
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This was the result of the expert subjective rankings.

Discussion Topics

At the beginning of the program we discovered that many stakeholders were not aware of how the media data ecosystem fit together. So, we provided this conceptual dataflow and used the gradual build of the image to highlight areas where data quality is compromised. Given the positive response to the diagram, we believe there should be more education for our industry on how data is connected and what we can do together to fix it.

Media Ecosystem



Recommendations

- Education → Internal audits
- Standards \rightarrow definitions, metrics, technical
 - Open watermarks
 - Universal IDs
- Open source metadata schedules, taxonomies, markets
- · Operational steps that correct data
- · Cross-association and standards bodies alignment



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This diagram adds the downstream and more inclusive perspective on how "all" of the data fits together for measurement and reporting. The emphasis is on all the stages where data quality can change, diverge, or converge. This is complex, but working and can improve.

The anchor recommendation of this CIMM project is to revisit the failed TAXI Initiative from over ten years ago. Revisit, but not revive.



The media ecosystem has evolved a bit since then, and there are new considerations that could drive adoption this time. 1. Cross-device and inventory dynamic ad insertion requirements are becoming more important to unlock ad revenue 2. Open and universal watermarking standards may coexist with proprietary watermarks and fingerprints and new payload techniques might solve some prior blockers. 3. Smart TVs provide large scale reading of WMs across inventory types and ATSC3 provides the standard that can carry the watermarks. Ads can more easily be watermarked, and video content could be processed with the universal watermark by the programmer or distributor. The world may have changed just enough to try again.



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This initiative assembled a summary of the current or proposed implementations of watermarks, fingerprints, and includes some newer techniques that are used to determine what is on the screen. We invited every company to edit the description of the methodologies and capabilities. The full paper is included at the end of this document.

NEXTGENTV Opportunities

- New data collection from broadcast, cable, MVPD
- · Watermarks and Internet behaviors
- · Different ownership of the data
- · Difference of opinion on potential impact
- · Activation incentive for new watermarks
- Inconsistent implementation of standards and competing Audio/Video options
- Value Prop
 - Data is defined in the ATSC3.0 standard
 - Apps collect data and send via IP



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One of the most passionate pleas from the stakeholders is access to more data from Smart TVs. Yet, very few demonstrated knowledge or interest in the data opportunities that will present from the implementation of the ATSC3 standards. This team believes this is a sleeper opportunity to bring more data into the ecosystem and that the community should embrace and develop the business models and partnerships to make the most of it for measurement. This could be a very important dynamic as it literally bridges the broadcast and internet service delivery.

OEM Estimated Coverage (Need to establish this view)

~2.3 TVs/HH, 123.5 million HHs, ~286 million TVs	Samsung	LG Ads			TCL		Philips					Other	Don't Know	Roku	Samba	Conviva
Statista Survey March 2023	32%	19%	12%	7%	6%	4%	3%	2%	2%	2%	2%	6%	3%			
Estimated HHs	39.52	23.465	14.82	8.645	7.41	4.94	3.705	2.47	2.47	2.47	2.47	7.41	3.705			
Estimated Devices per HH	1.8	1.3	1.5													
Self Reported HHs or Devices	72	30	22											70	3.5	
Connected/Active																
Matchable																
Opted In for Measurement																
Measurement Feed	No	Yes	Yes													
ATSC 3 Footprint	Yes, #?	Yes, #?	No	Yes, #?		Yes, #?								No	NA	NA
Networks covered for content measurement																
Networks covered for ad measurement																
Targeted Ads																
Other notables	Panel														ID graph	

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There is limited information regarding the active footprint of each OEM and the number of households or devices that can provide any given capability. Projects like ARF's DASH Survey does nationally quantify the penetration of Smart TV brands, identify the location of the brands in the household, and whether it is used for steaming. It does not, however, quantify those that opt into measurement programs, which Smart TVs are ATSC3 feature-rich, and which have addressable advertising for all inventory types. As the measurement community attempts to model reach and frequency at a household or person level, the universe estimates for these capabilities are critical. For advertisers, the ability to assemble a plan that effectively combines the OEMs and the ability uniformly buy across OEMs is desired.



Solution Slides

(Numbered and linked in the online version from the overview list)

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Overview (Overview link is to the summarized notes. Individual links below jump to the specific slide for that solution set.)

- 1. The best short-term impact will be from driving foundational interoperability, with overlap
 - 1.1 <u>Common terminology for published</u> <u>descriptive statistics</u>
 - 1.2 Definitions of common metrics
 - 1.3 <u>Cross-platform technical standards</u>, including <u>watermarks (1.3.1)</u>
 - 1.4 <u>Disclosure of methodology and</u> <u>quality</u> — FPs may not be efficient for larger role in measurement
 - 1.5 <u>Cross-platform program and ad IDs</u> and taxonomies for the categories of content and ads
 - **1.6** Services or instruments that can support access to common libraries for content and ads, and schedules
 - 1.7 Identity graph system and householding
 - 1.8 Cross OEM test lab

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- 2. The longer-term and greatest impact will be to draw more data into use for measurement
 - 2.1 Additional types of data collection
 - 2.2 Change in app permissions
 - 2.3 <u>Subpanel</u>
 - 2.4 ATSC3
 - 2.5 <u>Revenue</u> Opportunities and buyside incentives

2.6 <u>Cleantech</u> programs (or below?)



- 3.1 <u>Education</u> to align the industry on measurement issues
- 3.2 <u>Cross association coordination</u>3.3 <u>Project administration and</u>
- commitments
- 3.4 <u>Cleantech</u> programs
- 3.5 Perspective on privacy

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The counts of measured devices and households reported by various licensees are confusing because they appear to be inconsistent

Breakdown the terminology into descriptive statistics (requires no tech), metrics (should require no tech), and standards (may require changes to adopt but requires no new tech)

- CIMM Working Group generate recommendation 1. from buyers-sellers and measurement companies
- 2. OEM feedback and iteration
- З. OEM pledge and timeline
- 4. Publish summary stats

Publish a common set of terminology for OEMs, Measurement companies, and Sellers to use

Pro on trust, accurate aggregations,

decisions...Cons on changes to historical data. Transparency → Trust, Increased Quality

Chief research officers from agencies and measurement companies OEMs, Measurement Cos

?

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1.1 Common Terminology

Buy - Get the information they need to build plans; more accurate and clear definitions from "Count" companies

Sell - Get information they need to better manage inventory, create new offerings; more accurate and clear definitions from "Count" companies

Count - Levels competitive references, appropriately puts responsibility with the providers, highlights methodology choices OEM - Levels competitive references

Support - ?

1.2 Metric Definitions

Officially kick-off session with the [?] CIMM working group to manage the project. Summarize list of statistics that were referenced in the audit phase: Total number of devices that generate data, total number that are active, total that return measurement data, active with household demographics, subset that can read watermarks and collect fingerprints, subset that is ATSC3 ready, networks measured, apps measured, demographic skews, average time captured per period.

Interoperability Group - 1.2

no new tech)

5. Publish

1.

2.

3.

4.

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to compare or integrate

working group to manage the project. Summarize list of metrics that were referenced in the audit phase: Duration of view (tune thresholds used for

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1.3 Standards



nmi

Pro	blem	Solution	Benefits by Stakeholder Group
Ead	ch OEM uses different technical standards so it is	Collect definitions from all OEMs for their UE's	Buy
difficult to integrate and summarize data into measurement and operations for rev		and FP logic. Publish these	Sell
			Count
Imp	plementation Ideas/Options	Pros	OEM
Breakdown the terminology into descriptive statistics (requires no tech), metrics (should require no tech), ar standards (may require changes to adopt but requires no new tech)		All consuming the data will be on equal footing regardless of the provider.	Support
	,	Cons	
1.	Cross platform, cross OEM, watermarks for measurement and activation	OEM's consider their fingerprint processing a differentiator. OEMs need financial incentive to	
	a) Ads	adopt standards	Next Steps
	b) Content	Critical Path Participants	Define universe's, [total sets sold, total sets opted in for fingerprinting by month, total sets enabled
2.	Other (as identified by the metrics alignment)	OEMs, Measurement Cos	to read watermarks by month, total sets available
	a) Finger Print resolution		for FAST activity by month, stations collected for fingerprint matching]. Ask OEM's to publish
	b) TV OFF		universe numbers and fingerprint processing
		Unknowns	thresholds [sampling every x seconds, where
		Will the industry adopt open standards? How	samples are taken fromj.
	d) ????	iong will it take to align standards?	
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Interoperability Group - 1.3.1

Problem

Content is incorrectly or not identified when presented for viewing.

Implementation Ideas/Options

Use watermarking to directly carry or indirectly (by reference URL) content and ad creative identifiers. Propose using EIDR & AD-ID or UCID.

Revisit TAXI

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- Use ATSC-3 audio watermark to cary content DOI's OEM's report DOI's directly or resolve DOI's for EIDR/AD-ID/UCID
 - · Investigate EIDR mirroring services
- Use ATSC-3 video watermark to carry EIDR/AD-ID/UCID directly

solution

Embed watermarks and use the existence of the watermark to identify the program/episode or the advertisement/brand as well as where in time (related to total duration) the viewing occured.

Pro

Definitive identification of content & ads.

ons

Not all OEM's support reading watermarks. Requires several parties to participate. Cannot be used for historical or already published content

Critical Path Participa

OEMs, Content Provider(s), Measurement Companies.

Jnknow

Is measurement enough to support adoption or is activation needed? Watermark standard(s) that all OEM's will support.

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1.3.1 Standard Watermarks

ofite by Stekeholder Croup

Buy - Accurate identification of all versions of creatives.

Sell - Ability to license and or restrict access to activity within their content.

Count - Resolve directly from content providers.

OEM - Potential to streamline the reporting of activity, OEM can still use ACR in addition to providing watermark reporting

Support - Standard identifiers for resolving content and how much of it was watched.

ext Steps

Identify a watermark (video or audio), Identify an OEM that supports reading & retaining watermarks, a publisher who is or has committed to integrate watermarks for a trial. Identify timelines for TV sets that will support watermarks and publishers to implement watermarking.

1.4 OEM Methodology and **Technical Standards**



Pro	bler	n	Solution	Benefits by Stakeholder Group
It is not known if the difference in methodologies impact metrics, even when the names suggest alignment.			Ask OEMs to publish methodologies; ask MRC to publish accreditation best practices; establish a test lab to compare the behaviors and resulting data across a set of scripted behaviors	Buy Sell Count
Imp	olem	entation Ideas/Options	Pros	OEM
Publish a paper similar to the converged TV report that aligns the similarities and differences in			Alignment of techniques for better processing. Consistency in market place	Support
a)	OE	M methods		
	i.	Algorithmic assignments	Cons	
	ii.	Gap filling	OEM's could see removal of their market	
	iii.	Matches		Next Steps
	iv.	Frequency of classifications	Critical Path Participants	Establish working group to reconcile MRC's practices with various OFM's differences. Use
	v.	Types of content measured	OEM's, Measurement CO's, Buyers	Cross association program office to manage and
b)	Technical standards			drive consistency between OEM's and adoption by buyers
	i.	HDMI source		
		ATSC3 implementation datails	Unknowns	
			OEM's see their technology as a differentiator in supporting existing revenue streams. Conflicts between OEM's	
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Interoperability Group - 1.5

Content incorrectly or not identified when presented for viewing. Many companies and associations are creating new systems of IDs that are not open or interoperable

Support a program that can Unified IDs across systems and share a common taxonomy

Failure of TAXI Complete

CO's, OEM's, buyers

ecosystems.

1.5 IDs and Taxonomies

imr

Buy Sell Count OEM Alignment of requirements and incentives. Support Net result is less viewing attributed to ratings, lower reach and frequency, mischaracterization of behavior

Align on taxonomies, Align on SLA's and operational requirements

Universal adoption of Ad-ID and EIDR+ for all platform references

- Education Sessions for Ecosystem a.
- Audit business operations across the ecosystem to determine where they are not yet implemented b. and why Work with IAB, NextGen/Pearl, SCTE, SMPTE to
- c. ensure adoption of open and interoperable standards

Use AI to create unified classification hierarchies for Ads and Content - work with EIDR and Ad-ID

- a. Link to IAB taxonomies Link to IMDB, TVDB and other ID systems, Link to b.
- ER (?), IRIS c. Maintain and publish the classification logic or an
- API service that assigns it, or a table reference d. Look at commercial and content registry overlaps
- and assess if can support operational requirements. \rightarrow EIDR mirror services is a perfect example

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EIDR, AD-ID, ExtremeReach, IRIS, Measurement

Operational and/or transactional needs for digital

1.6 Libraries and Schedules



Problem	Solution	Benefits by Stakeholder Group
Content incorrectly or not identified when presented for viewing. Measurement is incomplete due to the cost to develop and maintain comprehensive monitoring of all markets at the station-level and on demand content	Promote a non-for-profit source to build and administer the foundational assets that can be accessed by any (paying) company.	Buy Sell Count
Implementation Ideas/Options	Pros	OEM
 Use AI to create as run schedules for all markets and stations a. RFP, CCR, Hyphametrics, other b. Assign a Universal Telecast IDs, build on EIDR and the AAIS initiative Build a clearinghouse for publisher or station provided schedules a. Manage as a service b. Assign a Universal Telecast ID Create and maintain open source market definitions a. UEs and boundary files b. Ask ARF/NORC c. Ask MediaOcean, WideOrbit. other? d. Ask Comscore, 605, Nielsen, Video Amp to donate the definitions e. Ask Hyphametrics to build new one that can also support a new panel 	Centralized service reduces costs, increases content captured, and increases accuracy of labeling. Cons Critical Path Participants OEMs, Content Provider(s), Measurement Cos Unknowns Consolidated format and schema for libraries and schedules	Support Next Steps Establish business model, See project 3.2 or 3.3
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Interoperability Group	o – 1.7	1.7 Identity and Householding
Problem	Solution	Benefits by Stakeholder Group
Devices are not universally associated with the correct household profile, IP Addresses are temporary/change	Create a cross identity mapping of the identity ecosystem and compliance best practices/pledges on their use	Buy Sell

Count OEM

Support

CIMM privacy program

Align with clean tech (2.6), Take direction from

Unduplicated reach and frequency, better controls for campaign spend, better inventory optimization.

Potential conflicts with privacy, disruption of existing OEM models.

OEM, Measurement co's

(Deterministic, Probabilistic, Accuracy Rating) Unknowns

7. Develop a pledge or business terms Establishment of comprehensive identity spine

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3.

JIC (?)

1. Establish a laddering of Identity systems that is anchored to a home address

an ensemble approach

around compliance

2. Establish a process to assign the best profile from

Identify 3-5 systems that can be ratified by the

4. Work with cleantech and graph companies

5. Review/recommend a validation vendor

a. Truthset Blockgraph, Conviva 6. Map providers, the methods, and quality rating

1.8 Quality Controls

2.1 Additional Types of

Data Collection

Buy Sell Count OEM

Support



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Pr	oblem	Solution	Benefits by Stakeholder Group
Content incorrect or not identified when presented for viewing.		Embed watermarks in content and use the existence of the watermark to identify the	Buy Sell
		program/episode or the advertisement/brand	Count
			Count
Im	plementation Ideas/Options	Pros/Cons	OEM
1.	Open watermark measurement readers	Definitive identification of content. Not all OEM's	Support
2.	Expanded FP libraries and schedules (both coverage and accuracy)	support ATSC-3 watermarks. Requires several parties to participate. Cannot be used for historical content	
3.	Establish a test lab to confirm the performance of methods, standards, and accreditation requests		
	a. Testing protocols		Next Steps
	 Define issue resolution process and communication channels. 	Critical Path Participants OEMs, Content Provider(s), Measurement Cos, Buyers, Sellers	Identify an OEM that supports technology, a publisher who is or has committed to integrate watermarks to trial. Identify timelines for TV sets that will support watermarks and publishers to implement watermarking. Organization to run the test lab
		Unknowns	
		Picking a watermark standard that all OEM's support.	
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More Data Group – 2.1

OEMs typically provide ACR and event streaming data, but do not commonly provide additional data that can improve the interpretation of viewing behavior

Channel change, volume +/-, PIP, HDMI source,

4. Use the current instream ondemand content data for identification – like what Inscape is doing.

ON/OFF, attached device brands, list of

Pros

Improve the quality of the behavioral insights. Greater detail, improve interoperability, etc...

Ask OEMs to add most valued features.

Expense for more data collection and processing

Critical Path Participants Identify and align what to collect and report, See project 3.2 or 3.3 OEMs, Measurement Cos, CIMM oversight

a. Interactive information

1. HHID and device IDs

installed apps

2. Devices on the network?

b. Surveys

5. Other

c. AI/ML - Navigation

OEM willingness to participate

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N	1ore Data Group – 2	.2	2 Mea	2.2 Change in App surement Permissions		
Pro The but me ent	oblem ere is a gap in content measurement caused by the siness contracts of a few OTT apps that prohibit asurement while presented from the native OEM vironment	Solution Ask them to change the contract or amend to permit measurement		Benefits by Stakeholder Group Buy Sell Count		
Im	plementation Ideas/Options	Pros	(DEM		
1.	CIMM – request the end of the prohibition. Provide rights to measure across more companies	More complete data. Stronger link to identity based on app subscription records.		Support		
2.	Ask ANA to require open measurement of native applications that use ads	Cons				
3.	Audit the difference in viewership from ACR, streaming events, Conviva, AI/ML	?		Next Steps		
4.	Study the relationship between across native and dongle	Critical Path Participants	/	App owners remove permission restrictions for nonitoring activity within their applications and		
	a. Summarize the title rankers to identify the variance by reporting source	Content Providers, OEMs, Measurement Cos	i 4	allow OEM's to collect and report activity		
	b. Summarize time in app					
5.	Ask content owners (those distributing to closed native apps) to require open measurement	Unknowns Legal path/timelines to getting revised agreements				
N	1ore Data Group – 2	.3		2.3 Subpanel		
Pro	oblem	Solution		Benefits by Stakeholder Group		
On pu	ly a few OEMs sell viewing data for measurement rposes	Create an organization to identify a representa sample of smartTV HH and devices, collect th usage data from all OEM and report metrics.	ative I	Buy Sell Count		
Im	plementation Ideas/Options	Pros	(DEM		
1.	Sub-sample from an articulated set of HHs a. OEMs	Consolidated set of consistent data to model total UE from	\$	Support		
	b. JIC	Cons				
	c. Conviva	Ability to get cross OEM or programmer				
	d. Other SDKs	participation. Competitive questions		Next Steps		
	i. Comscore			dentify methodology to manage panel. Obtain		
	ii. Nielsen	Critical Path Participants	ä	agreement from OEM's to participate, Identify		
	iii. Others?	Cilvilvi or managing organization, OEMs	ł	panel output and distribution		
	e. Other panels?					
	i Who bought Verto?					
0		Methodology to identify and manage HH/Devi	rices			
2.	Use same rins as AWAV VAD VID Companies?	participating. Organization to run panel.				

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More	Data	Group	-2.4
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2.4 ATSC3



Problem	Solution	Benefits by Stakeholder Group
Only a few OEMs sell viewing data for measurement purposes	Nurture the development of ATSC3 across programmers, stations, and OEMs for measurement purposes. <u>AAIS question</u>	Buy Sell Count
Implementation Ideas/Options	Pros	OEM
 Education of national programmers and local affiliates Use cases Timeline Ownership Revenue model 	Watermarks and interactivity can be generated by all ATSC devices. More business can negotiate rights to the data Cons OEM's and content providers need to adopt standards	Support
a. Measurement		Next Steps
 b. Activation c. Outcomes 3. Importance of standards adoption a. Definitions i. Markets, schedules, content and ad ids 	Critical Path Participants Programmers+Stations, Distribution channels, OEMs, Content Providers, Measurement Cos	Education, Consolidation of WM used for measurement with ATSC-3
b. Technical features	Unknowns	
i. Use of watermarks, etc4. Privacy opportunities	Adoption by OEM's, costs and time for ATSC-3 enabled to be majority of UE. Been on radar for ages will it take	
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More Data Group - 2.5

Only a few OEMs sell viewing data for measurement

Add buy-side requirements to the I/O contracts

Discuss structures that would incent OEMs to participate either at a campaign level or larger scale such as a panel, subset of data or census behaviors

> Agency negotiates a premium cpm for data to be made available in the cleanroom or passed to the measurement company or

Identify objections with OEMs and opportunities to solve the objections

Buyers mandate OEM participation in open data to purchase inventory

More data into the ecosystem,

Conflicts with existing revenue models. Additional costs in more data.

Buyers, Advertisers, OEMs

Will buyers and OEM agree?

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2.5 Revenue Incentive

Buy

Sell Count

OEM

Support

Agreement on buyers to move forward, establish time frame for OEM's to meet. Ask CIMM working group to develop the potential incentive structure.

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purposes

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Implementation Ideas/Option

advertiser/agency

More Data Group - 2	.6	2.6 CleanTech
Problem	Solution	Benefits by Stakeholder Group
Only a few OEMs sell viewing data for measurement purposes	Define a case study to demonstrate how a cleanroom can be used to effectively provid measurement for XP campaign while protect privacy and proprietary business concerns	Buy le Sell Count
Implementation Ideas/Options	Pros	OEM
 Privacy ID spine and ladders Compliance and enforcement Permission administration 	Eliminate privacy concerns, unduplicated re and frequency Cons Potential for different results.	each Support
3. Unification standards		Next Steps
a. Open source, syndicated definitionsb. Algorithms to bridge disparate data sources	Critical Path Participants OEMs, Measurement Cos, CleanTech provid	Identify a cleanroom provider(s), Identify a campaign, Identify OEM's to provide activity, der. Identify an analyst to review and produce results
	Interest in CIMM PMO role	
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Education and Coordination - 3.1

3.1 Education Programs

cimm biocitien for increases measurement

Problem	Solution	Benefits by Stakeholder Group
Community does not see the end to end picture and cannot recognize the benefits of their contributions to cohesive and complete measurement.	Develop and present educational content that provides context and incentive to collaborate for better measurement	Buy Sell Count
Implementation Ideas/Options	Pros/Cons	OEM
 Ad Ecosystem Plan, Activate, Measure Data Ecosystem	Better understanding from content providers to measurement companies of how what they add or fail to add impacts reporting as a whole. Critical Path Participants CIMM, Buyers, Sellers, Counters Unknowns Organization to build courses and distribute	Support Next Steps Collect materials and generate seminars & self paced training. Revise and review every 6-12 months as other efforts progress.
58 Cc	naterials.	

Education and Coordination – 3.2

3.2 Cross Association Coordination



Problem	Solution	Benefits by Stakeholder Group
Disparate initiatives across the Advertising ecosystem do not effectively consider interoperability and implementation issues	Create a cross association communication protocol that can inform respective associations, build consensus, and ratify implementation commitments	Buy Sell Count
Implementation Ideas/Options	Pros/Cons	OEM
1. Associations mapping that cover major device types and stakeholders	Solid and unified roadmap for linear and digital distribution channels that will support buyers and sellers cross platform needs	Support
2. Communications system		
a. Calendar of quarterly meetings, email, joint reviews, etc		
3. Commitment to participate		Next Steps
a. Overall	Critical Path Participants	Discuss cross association coordination that
b. Initiative	IAB, Content Providers, OEMs, Measurement Cos, CIMM	Labs, SMPTE, other?
	Unknowns	
	Desire of associations to collaborate	
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Education and Coordination - 3.3

3.3 Project Administration

Problem	Solution	Benefits by Stakeholder Group
Some CIMM initiatives have failed to deliver meaningful evolution of media measurement	Sponsor specific initiatives with long term administration and management to measurable goals	Buy
		Sell
	5040.	Count
Implementation Ideas/Options	Pros/Cons	OEM
1. Accountability of CIMM administration of initiatives	Do members get enough value today and is there	Support
a. E&Y, TAXI?	an interest to move beyond discussions and dialog?	
b. ROI?		
2. Accountability of members		
a. Commit to standards		Next Steps
b. Provide input/sweat equity		Establish program management at CIMM.
3. Voting/funding board (is what is in place sufficient?)	Critical Path Participants	
	IAB, CIMM, OEMs, Measurement Cos	
determine CIMM's role in aligning roadmaps		
	Liekeewee	
	Unknowns	
	CIMM's desire to lead and fund participation	

Coalition for Innovation in Media Measurement, October 2023

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Education and Coordination – 3.4

3.4 CleanTech Programs



Pro	blem	Solution	Benefits by Stakeholder Group
The industry is overwhelmed by the pace of evolution and do not know if cleanrooms and cleantech are solutions or the latest shiny new object		Evaluate CleanTech for mitigation of barriers & collaboration – respect privacy, controlled - gardens, improve operational efficiency	Buy Sell Count
Imp	lementation Ideas/Options	Pros	OEM
1.	Showcase working case study to demonstrate cleanrooms combining data from several different sources.	Minimize the concerns on privacy.	Support
2.	Compare results from different cleanroom providers.	Cons Cost and effort to review multiple providers	
3.	Discuss and explain any differences in results from different cleanrooms.		Next Steps
4. Feature clean tech developments in the CIMM newsletter		Critical Path Participants OEMs, Measurement Cos or cleanroom providers, analysts	and Identity CIMM project leaders.
		Unknowns	
61	Coa	inton for innovation in Media Measurement, October 202	5
61 E	coa ducation and Coord	lination – 3.5	6.5 Perspective on Privacy
61 Er	coa ducation and Coorc	lination - 3.5	5.5 Perspective on Privacy
61 Pro Eac	Coa ducation and Coorc blem th company (and association) adopts a different specifice on privacy and the advertising community	Solution Use the cross association coordination to develop a more comprehensive madman for the	5.5 Perspective on Privacy
61 Pro Eac pers fails	Coa ducation and Coorc blem h company (and association) adopts a different spective on privacy and the advertising community s to protect consumers and the advertising	Solution Use the cross association coordination to develop a more comprehensive roadmap for the development of privacy protecting	5.5 Perspective on Privacy
61 Pro Eac pers fails mea	Coardination and Coord blem th company (and association) adopts a different spective on privacy and the advertising community sto protect consumers and the advertising asurement	Solution Use the cross association coordination to develop a more comprehensive roadmap for the development of privacy protecting methodologies, policies and policing	5.5 Perspective on Privacy
61 Pro Eac pers fails mea	Coartigon and Coorting blem the company (and association) adopts a different spective on privacy and the advertising community sto protect consumers and the advertising asurement	Solution Use the cross association coordination to develop a more comprehensive roadmap for the development of privacy protecting methodologies, policies and policing Pros/Cons	Benefits by Stakeholder Group Buy Sell Count OEM
61 Pro Eac pers fails mea 1.	blem th company (and association) adopts a different spective on privacy and the advertising community to protect consumers and the advertising surement blementation Ideas/Options Showcase or design research and solutions a. Al b. Blockchain/Encryption c. Synthetic	Solution Solution Use the cross association coordination to develop a more comprehensive roadmap for the development of privacy protecting methodologies, policies and policing Pros/Cons Pro: Maintain an ability to collaborate with deterministic measurement data	S.5 Perspective on Privacy
61 Pro Eac pers fails mea 1.	blem th company (and association) adopts a different spective on privacy and the advertising community a to protect consumers and the advertising asurement blementation Ideas/Options Showcase or design research and solutions a. Al b. Blockchain/Encryption c. Synthetic Unify voice of the buyers and sellers – what is the ideal scenario	Solution Solution Use the cross association coordination to develop a more comprehensive roadmap for the development of privacy protecting methodologies, policies and policing Pros/Cons Pro: Maintain an ability to collaborate with deterministic measurement data	S.5 Perspective on Privacy
61 Pro Eac pers fails mea 1.	Construction and Cooperation Company (and association) adopts a different spective on privacy and the advertising community to protect consumers and the advertising aurement Internation Ideas/Options A M B Blockchain/Encryption C Synthetic Unity voice of the buyers and sellers – what is the clean scenario Badges/pledges for privacy compliance standards and penalties for infractions?	Solution Use the cross association coordination to develop a more comprehensive roadmap for the development of privacy protecting methodologies, policies and policing Pros/Cons Pro: Maintain an ability to collaborate with deterministic measurement data Critical Path Participants Publishers, OEMs, Measurement Cos (if have 1s party data), Advertisers Unknowns CCPA legislation	 Benefits by Stakeholder Group Buy Sell Count OEM Support Next Steps CIMM privacy project to set the stage for the conversation on what to do to protect our access to data

Coalition for Innovation in Media Measurement, October 2023

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Watermark - Fingerprint Paper

WM FP summary final 92123



Watermarking

Is the insertion of (possibly encrypted) metadata in original content that can be augmented or read at downstream distribution points and viewing devices. In the context of media they can be audio or video based and may be used to carry identifiers for the media (program, show, episode or advertisement) and information such as timecodes, URLs, and messages that support related capabilities (e.g. measurement, interactivity, ad signaling, etc.).



Automated Content Recognition

The process of identification and classification of objects or events in an audio-video stream based on unique characteristics. Samples of content are analyzed at or before distribution to build a library (of fingerprints) and end devices analyze samples of viewed content and attempt to match against the library. Automated Content recognition can be augmented with pattern recognition aspects of AI or ML. AI/ML can also be used to recognize content from the glass. This requires the AI to be trained to classify content which it has never seen before.



	Watermark	ACR (fingerprinting)	ACR (AI or ML augmented)
Video-Based	yes	yes	yes
Audio-Based	yes	yes	yes
Updatable logic	yes	yes	yes
Encryptable	yes	no	no
Origin or Creation	Needs to be created and inserted or injected either audio or video by	Content needs to be mapped for matching. Works best at content	Training can be required for newly generated content.
	a content provider or distributor.	distributors so variations in local content can be	Works best at content distributors so variations
	Provider is preferable.	recognized.	in local content can be recognized.
Frequency	Audio Data rate: ~100bps Synchronization accuracy: Acquisition time/minimum detectable segment: 2-5 seconds	Lower quality content requires longer sampling. Depending on OEM, sampling varies between multiple samples per second to sampling every	Dependent on OEM, and quality of content. Lower quality requires longer sampling.
	Video Data rate: ~8 kbps Synchronization accuracy: Frame-accurate	several seconds.	
	Acquisition time/ minimum detectable segment: 1 video frame.		

	Watermark	ACR (fingerprinting)	ACR (AI or ML augmented)
Pros	 Audio Definitive identification, easy to distinguish versioning of content or creatives. Scales to an unlimited amount of identifiable content without growth in operating cost or degradation of performance. Acoustic pickup can open potential for measuring out of home activity. Potential for triggering companion activity. e.g. surveys etc. Can directly contain EIDR/AdID values. Openly specified technologies can be modified or removed along the distribution chain. Can be used regardless of ACR being enabled. Can generate activity even if TV is muted 	 Can be used retroactively to identify content. Can be used regardless of embedded watermarks. 	 Can be used retroactively to identify content. Can be used regardless of embedded watermarks. AI/ML can adjust for differences and enhance matching libraries.
	even if IV is muted.		

Watermark	ACR (fingerprinting)	ACR (AI or ML augmented)
 Video Definitive identification, easy to distinguish versioning on content or creatives. Scales to an unlimited amount of identifiable content without growth in operating cost or degradation 		
 of performance. Potential for triggering companion activity. e.g. surveys etc. Capable of being 		
 Can directly contain EIDR/ADID values. Can generate activity from PIP or split parage diaptate 		
 Can be used regardless of ACR being enabled. 		
 Openly specified technologies can be modified or removed along the distribution chain. 		

	Watermark	ACR (fingerprinting)	ACR (AI or ML augmented)
Cons	 Audio Open standard technologies can be modified or removed along the distribution chain. Payload cannot support direct EIDR- ID transport. Video Openly specified technologies can be modified or removed along the distribution chain. Poor transmission (pixelation in OTA or reduced resolution in down converted content) can impact detection. Cannot be used retroactively. e.g if the watermark is not injected, it can't be read. 	 No standards between OEM's on actual processes or match algorithms. Can only say content is similar to something in the fingerprint library. Requires an ever growing match database or content must be removed from matching eligibility. Difficulty distinguishing ads vs content (tune-in promotions). Identification lags generating inconsistent start/ stop times. Split Screen & Pip can hamper matching. Requires content providers to allow ACR to be enabled. Poor transmission (pixelation in OTA or reduced resolution in down converted content) can impact be compensated for by longer samples being used for detection. Mapping of local content may be economically non- wishle autoide of 	 Can only say content is similar to something in the fingerprint library. Requires an ever growing match database or content must be removed from matching eligibility. No standards between OEM's on actual processes or match algorithms. Difficulty distinguishing ads vs content (tune-in promotions). Identification lags generating inconsistent start/ stop times. Requires content providers to allow. Poor transmission (pixelation in OTA or reduced resolution in down converted content) can impact be compensated for by longer samples being used for detection. Mapping of local content may be economically non-viable outside of major markets.
		major markets.	



Watermark	Туре	Pros	Cons	Notes/Follow up items
ATSC3 (A-335)	Video	 Open standard, adopted by ATSC/NextGen TV (US/Canada/ Mexico/Brazil/ S. Korea) and DVB/ HbbTV (Europe/ Australia/Africa). Example source code is publicly available to generate and read watermarks. Commercially supported by Verance Aspect (see below). Can Support ad replacement. Frame accurate. 30 byte payload per frame 60 byte max payload for 2 lines. Can carry AD-ID directly. Can carry EIDR ID. Can be embedded as a graphical overlay by a playout device to carry a session-level identifier or beacon. 	 Can be removed and/modified. 	 See <u>A-336</u> Supports down to 480p resolution. Most practical use cases are limited to 1 line as 2 lines for a watermark cannot be made invisible.

Watermark	Туре	Pros	Cons	Notes/Follow up items
ATSC3 (A-334)	Audio	 Open standard. Example source code is publicly available to generate and read watermarks. Commercially supported by Verance Aspect (see below). Survives delivery via HDMI and ATSC 1.0 to nextGen TV's. 	 Constrained payload (<u>127</u> <u>bits</u>) 50 bits of actual data payload per 1.5 seconds. Cannot support direct transmission of EIDR-ID. 	 See <u>A-336</u>, <u>A-333</u> Used to trigger HTML5 web apps. (Including Run3TV, a proprietary app framework created by Pearl TV). 1.5 second frequency. Can support EIDR and AD-ID via indirect polling.
Kantar (TAXI Complete)	Audio	 Open standard. Built for the SMPTE specifications, guided by CIMM members. Varying frequency for content and ads. (5 seconds for content, 2 seconds for ads). Payload size capable of EIDR/ AD-ID (current format). Distributor (contains up to 4 distributor IDs) watermark injected every 28 seconds with timestamp. 	 Licensing required to create and embed & read. Not granular enough for ad replacement. No publicly available example source code to generate or read watermarks. 	 See Taxi Complete documentation. Acoustic pickup enabled out of home recognition not relevant to smartTV measurement.

Watermark	Туре	Pros	Cons	Notes/Follow up items
Vizio OAR	Video	 Derivative of A-335 1x watermark. Can support Ad replacement. 22MM Vizio TVs are enabled to read this. 	 Closed / proprietary technology. Cannot support less than 720p screen resolution (564 digital subnets cannot be supported). Data payload 40 bit cannot support EIDR. The TV Client needs to receive the consortium keys and the appropriate publisher keys in order to read the watermark. 	 This implementation is a derivative of A335 but does not conform to the spec and conflicts with ATSC specified uses of A/335. OAR and A-335 cannot coexist in the same video content. The two differences between OAR and A335 are Brightness and Color of the Video Watermark that Vizio developed that made the Watermark less visible.
Teletrax / Kinetiq	Video	 Not visible. Can support ad replacement. In use now for over the air market-level monitoring. 210 DMAs. 1,600 Channels including National and Cable networks. 	 Proprietary technology, requires licensing. IP may be Owned by Civolution. 	
Video Encoded Invisible Light (VEIL) - Advocado	Video	 Not visible. Can support ad replacement. Not In use now. 	 Proprietary technology, requires licensing. Advocado owns IP. 	

Watermark	Туре	Pros	Cons	Notes/Follow up items
Advocado Audio Encoded Inaudible Sound (AEIS)	Audio	 Can Conform to A334. Can Conform to TAXI Complete. In use now by Advocado for over the air market-level monitoring. 210 DMAs. 1,978 Stations, Networks, Cable Networks and Diginets. 	 Proprietary technology, requires licensing. Advocado owns IP. 	
Verance OBID VP1	Audio	 Derivative of A334. Repeats every 1.5 seconds. 		 Offered to SMPTE by Verance as an open standard extension of A/334, not yet selected for standardization. Supports larger payload than A334 that can directly transport AD-ID and EIDR ID in compact formats.

Watermark	Туре	Pros	Cons	Notes/Follow up items
Verance Aspect	Audio	 Conforms to A334. Several local station groups and NextGen TV television manufacturers are using it. Supports A333 for content reporting. 		 See <u>A-336</u> Used to trigger HTML5 web apps. (Including Run3TV, a proprietary app framework created by Pearl TV). 1.5 second frequency. Can support EIDR and AD-ID via indirect polling.
Verance Aspect	Video	Conforms to A335.		Supports down to 480p.
Nielsen CBET	Audio	 In use today Radio => layer 1 TV => layer 2 Distributor => Layer 5 Lightweight runs in 1-3 KHZ. 	 Proprietary. All 3 CBT, N6, N2 required to cover full spectrum of human detectable KHZ. 	Acoustic pickup used for PPM and wearables for TV and out of home measurement. Highly accurate in noisy conditions such as auto, bar, etc.
Nielsen N6	Audio	 In use today and multi-level design. 	Proprietary	N6 is the audio watermarking Nielsen uses in set meters and peoplemeters. It is multilevel and designed for acoustic use with line, button mic, on board acoustic mic detection. Also has payload for a commercial ID unique to Nielsen.
Nielsen N2	Audio	 In use today. 	Proprietary	N2 is another audio watermarking technology for distribution mapping of national/ local sources.

Watermark	Туре	Pros	Cons	Notes/Follow up items
Nielsen PAS	Audio fingerprint	LightweightIn Use today	 Proprietary Requires 30 sec of content to identify. 	Legacy system providing additional crediting and/ or backup to watermarking when issues arise (no code, hardware failures, etc).
Nielsen StreamFP	Audio/Video fingerprint	 In Use today. Greater frequency than PAS. Can be detected out of home by companion. Mobile devices e.g. phones 	 Proprietary granular fingerprinting detection. 	Newest high resolution passive fingerprinting solution as secondary to watermarks or primary for non encoded/ non watermarked material.



Initial Perspective



Goal is an open audio and video watermark that can span digital and linear use cases in support of measurement and real time ad replacement, definitively identify the content and ads presented referencing the time into content, and fit into an open framework for universal interoperability.

Ideally, a mechanism used to embed, transport and provide *definitive* identification of content (ads or programs) being presented is preferable with a fallback of using content recognition where the definitive identifications are not present. Regardless of method used, content recognition matches against a library or watermark decoding at the device level, the various OEMs own and retain that information and they need to be incentivised to make that data available in a manner that outweighs the revenue and business opportunities of keeping that data private.

- Watermarks need to be open and readable to all. This review is focused on measurement and not activation so audio or video would work, from an industry perspective though it seems that video would be preferable as it can be used for both measurement and activation.
- Content Recognition should drive to a single unified match source where all OEMs can
 use to match their screen/audio profiles to. Either industry sponsored or OEM shared cost.
 This would support a larger library e.g. more stations, networks, markets and longer duration
 for matching time shifted material.
- Content Recognition logic should be consistent across OEM's, Ideally CIMM could support a Content Recognition logic module that OEM's could plug into their platforms to perform content analysis for measurement.
- Some have spoken of API's to enable the smartTV platform to be informed of the content any specific app (native or device used) can inform the TV of what is being played. This should be standardized.
- EIDR, AD-ID (or UCID) all need to support the digital bid operational model. While currently they cannot support that transactional operational model, they can provide mirrored services that the IAB can operate to support near real time id resolution.

Time is an important construct to accurate measurement, not only does the industry need to know what is being consumed, they need to know when it was consumed and what portions were consumed. e.g. where in relation to the start did the viewing take place and where in relation to the end was viewing stopped.



Measurement Proposal #1

Use A-334 (audio) to indirectly get EIDR/ADID and offset into content from providers delivered back to the TV, TV to save and report:

=> deviceID, source, start, stop, EIDR/ ADID, time into or offset.

Providers have access to this same information from logs of watermark activity if they do not wish to subscribe to s platform for measurement of their content.

Providers (as well as cable networks) neet to embed watermarks

Providers need to stand up back end services to respond to watermark urls TV oem's need to implement A-334/A-333



Measurement Proposal #2

Content providers generate DOI to reference EIDR/AD-ID Content providers embed DOI in A-334 audio watermark SmartTV extracts DOI from watermark builds activity report:

=> deviceID, source, timestamp, DOI

Reporting vendors acquire activity reports from smartTV's and Query DOI's to resolve EIDR/ADID, offset into content.

Content providers can authorize who is allowed to resolve these DOI's by api keys

Providers (as well as cable networks) neet to embed watermarks

Providers need to stand up back end services to respond to watermark urls & secure/authenticate access TV oem's need to implement A-334/A-333 (or other reporting standard)



Replacement/Activation

- **Complex**, use A-334 as described for measurement. Supports the smartTV to sync their internal clocks to network or broadcast clocks. Build ad replacement/splicing logic based off of time that supports content replacement. Construct overriding impression reports indicating replaced content was seen.
- **Straight forward**, use A-335 in conjunction with A-334. A-335 for direct replacement of Ads with replaced Ads containing the AD-ID in the watermark.



Datetime

Unix timestamp requires 32 bits to represent, but that only lasts till 2038 so to future proof may require as many as 64 bits

AD-ID

Comprised of 4 characters (A-Z), followed by 7 numbers (0-9), filled by 1 character

Character => 8 bits, 8*4 = 32 bits Number => 4 bits, 7*4 = 28 bits Character => 8 bits, 8*1 = 8 bits Total, <u>68 bits</u> to contain ad-id Compact binary for of ad-id = 32 bits Ad-id with timestamp => 32 +32 (64 bits) or 32 +64 (96 bits) May be in process of being updated in order to support all format variations of the creative

EIDR

Compact binary format of an EIDR ID is 96 bits EIDR ID with timestamp = 96+32(128 bits) or 96+64 (160 bits)

<u>ECID</u>

IAB Extended content ID - researching

UCID (universal content ID) Extreme Reach

11 digit alphanumeric, 7 bits per alphanumeric => 77 bits for UCID, UCID + timestamp 77+32 (109 bits) or 77**+64 (141 bits)**

AD_ID

Ad-ID + 8 its for raid_id

Ad-ID with timestamp => 76 +32 (108 bits) or 76 +64 (140 bits)

Clearcast

15 alphanumeric characters => 15*7 = 105 bits

UCID + timestamp => 105 + 32 (137 bits) or 105 + 64 (169 bits)

Client Specific

13 alphanumeric characters => 13*7 = 91 bits

UCID + timestamp => 91 + 32 (123 bits) or 91 + 64 (155 bits)

First, a database of fingerprints is generated using either audio or video fingerprinting.



Later, an ACR-enabled device (SmartTV for example), generates fingerprints of content that is being played which are compared with the database to recognize content.



Acronym Lookup Table

ACRONYM	DEFINITION	DESCRIPTION	EXAMPLE
OEM	Original Equipment Manufacturer	Smart TV manufacturer, or other Device Manufacturer	Samsung, Vizio, Hisense
MVPD	Multi Video Platform Distributor	A subscription service that provides video content from multiple programmers and distributes over multiple platforms	Charter, Comcast, Hulu Live, YouTube TV
ACR	Automatic Content Recognition	https://en.wikipedia. org/wiki/Automatic content_recognition	Audio or Video Fingerprint Matching
WM	Watermark	Information that is injected into the content transport stream that serves to identify the content or rights associated with the asset	VEIL,
FP	Fingerprint	A subset of data captured from an audio or video asset that is used to identify the asset when matched to sample captured during a subsequent viewing behavior	
AI/ML	Artificial Intelligence, Machine Learning	Automated computer process that uses training to identify or classify content	Convolutional Neural Networks, Optical Character Recognition, Natural Language Processing, Semantic Anlaysis, etc
Ad-ID	Advertising Identification	Proprietary ad identification (10 digit code) established by the ad owner and serviced by the company with the same name	

ALT-- ACRONYM LOOKUP TABLE

ACRONYM	DEFINITION	DESCRIPTION	EXAMPLE
EIDR	Entertainment Identification Registry	Proprietary content identification (code) established by the content owner and serviced by the company with the same name	
ΤΑΧΙ	Trackable Asset Cross-Platform Identification	A CIMM initiative from 2013 that established a workflow and technology that would embed IDs into broadcast assets	https://cimm-us. org/initiatives-2/ taxi/ https://thearf- org-unified-admin. s3.amazonaws.com/ CIMM/Documents/ CIMM-TAXI-Rollout- Briefing-from-Ernst- Young-4.18.2013. pdf https://thearf- org-unified-admin. s3.amazonaws.com/ CIMM/Documents/ TX_AIP.11.pdf
AAIS	Addressable Asset Identification Standard	A workflow and set of tools to embed EIDR and Ad-IDs into assets by the distributor	TitanTV video describes how it works
DOI	Digital Object Identification	https://www.doi.org/	
ECID	Extended Content Identification	IAB proposed standard to enable more sophisticated programmatic advertising	Link at IAB?
UCID	Universal Creative Identification	IAB proposed standard that can embed Ad-IDs and other IDs by using accredited registries	Link at IAB?
DASH	Digital Account Sharing	ARF Research Survey that quantifies the use of media devices and services in the home	NA

ACRONYM	DEFINITION	DESCRIPTION	EXAMPLE
IP Address	Internet Protocol Address	[For media measurement context] This is a code that is used to identify the router that is sending and receiving information over the internet. It is sometimes used as a proxy for home address.	
UGC	User Generated Content	YouTube or other social platform content that is not generally considered "premium" video	TikTok Video, "The Beast"
QC SDK	Quality Control Software Development Kit	An application that tracks requests and responses between the video player and video server. Data is used to monitor the speed of delivery and playout. It also can store detailed measurements about every interaction.	Conviva
A/SVOD	Ad/Subscription Video Ondemand	Services that provide on demand video	Netflix
DTC	Direct to Consumer	Consumer purchases access to video content directly from the Programmer	AMC+
FAST	Free Ad Supported Streaming	OTT content services that are ad supported	Tubi
UE	Universe Estimate	A quantification of a behavior or status that represents the entire group	Census, TV Households, Brand owners

ACRONYM	DEFINITION	DESCRIPTION	EXAMPLE
ATSC	Advanced Television Systems Commitee	An international, non- profit organization developing voluntary standards for digital television.	ATSC3 or NextGenTV, ATSC 334/335
SCTE	Society of Cable Telecommunications Engineers	An organization within CableLabs that sets the standards for cable technologies. Standards like those used to format and embed information into the transport stream.	SCTE 35, 104,
VAB	Video Advertising Bureau	https://thevab.com/ about	Association
IAB	Interactive Advertising Bureau	Parent of IAB Tech Lab <u>https://</u> iabtechlab.com/	Digital Advertising Standards
ARF	Advertising Research Foundation	https://thearf.org/	
ANA	Association of National Advertisers		
WFA	World Federation of Advertisers		
SMPTE	Society of Motion Picture Television Engineers		
JIC	Joint Industry Committee		
ISA	Independent Streamers Association		
	Local News Association		

Compilation of notes for the solution slides

CIMM Smart(er) TV Data Initiatives Hypotheses and Solutions

This document provides notes and more detailed descriptions of potential Smart TV data improvement projects. It is not intended for distribution or sharing with people outside of CIMM committees. The detail is provided in case it is useful for working groups who choose to work on the solution. The notes combine insights and recommendations from the stakeholder interviews as well as details further developed during the research phase. There are unfiltered references to companies and workflows, and should not be considered a CIMM recommendation, only compiled notes and concepts from over 40 interviews.

Problem

- 1. Big data is required to support fragmented media landscape and more efficient buying techniques.
- 2. Smart TVs can measure both traditional and OTT viewing at national scale.
- 3. Data from smart TV needs to be integrated with other data because each source is biased and covers only partial viewing behaviors.
- 4. Data is often incomplete, sometimes inaccurate, and not interoperable

Hypotheses Group 1 Interoperability (Smart TV data can better support measurement if it can use common ids): Focus on common and accessible identity of content, ads, people/ devices/houses, stations, and taxonomies

- Standards can support interoperability
 - Standards are popular (among buy-side), and need to be championed to be implemented. OEMs, Agencies and Measurement companies are willing to participate in these conversations.
 - Potential Solutions:
 - Select a team to draft the terms (or use a working group) and start with some recommendations for terminology and standards.
 - > Explore if it can be folded into the JIC definitions.
 - Build more universal reference services similar to the DASH survey
 - Common standards for terms, thresholds, instruments.
 - Terms and Descriptive stats by OEM [1.1]
 - > Total Households with the brand of Smart TV
 - > Total Devices
 - > Opt-in for measurement
 - > Opt-in for targeting
 - > Total Ad reach
 - > Total Active (any viewing activity in the past 90 days and 30 days)
 - > Active Matched to demographic profile (by match co?)
 - > Feature capabilities, capable of serving ads to...)
 - > Refresh interval weekly, monthly, quarterly?

- Definitions of source, modes and metrics that may require changes and discontinuity of data, but not software updates **[1.2]**
 - > Live (Synchronized), Time-shifted from Recording of Live, On Demand
 - > Access type (overall, and each tune) Use DASH definitions?
 - OTA (antenna)
 - □ BBO
 - □ OTT
 - Digital
 - □ Cable/Sat/Telco
 - > Broadcast
 - > Device
 - > Application
 - > Distributor
 - > Ad Supported
 - > Content Type Local, National, Syndicated
 - > Content Owner
 - > Etc.
- Standards that may require changes in software [1.3]
 - > Watermark or capture of Ad-ID, EIDR in stream
- Create Universal Reference Service
 - Common UEs and proportionality of the smart TV brands (DASH) should be available and generally accepted, ideally MRC accredited, to help inform or evaluate representation of subsets.
 - Common market definitions and UEs
 - Becuase DMA is a Nielsen-owned standard/product, and it is not universally available, the industry needs to establish and maintain a new common standard. Nielsen, VideoAmp, 605 or Comscore could contribute their definitions to an independent group and the universal standard would be available for any company to use for minimal cost.
 - CIMM, IAB, or the VAB or other JIC-like group would establish the asset and maintain it like the EIDR and AD-ID services.
 - High level demos are important to be comparable, interoperable, and integrated (Panel or Truthset?) in order to address the potential bias with OEM or specific app usage
 - Evaluate if Claritas, Experian, TransUnion, LiveRamp or others can offer a method to improve consistency. Can CIMM sponsor a basic set of demos that is accepted from the Truthset offerings? Can there be a cyclical update and validation of the anchor demos?
 - □ If not CIMM, can there be a non-profit, shared set of foundational services?

- Have OEM's ACR methods be consistent, or at least they need to publish their methods and processes. **[1.4]**
 - Educate the industry on the quality of ACR audio and video fingerprinting processes and how Smart TV OEMs are evolving with additional techniques
 - CIMM should sponsor an OEM comparagraph similar to the Converged TV paper.
 - □ Address accuracy rate
 - □ Techniques to get duration and variations assigned correctly.
 - □ Fingerprint methods are not all the same
 - Invite OEMs to fill out a comparison grid (some have agreed to correct one that we build)
- Shared resources can reduce the cost and increase the quality of measurement and interoperability
 - Common metadata and taxonomies are very important and need to be accessible to all (not proprietary.) [1.5]
 - Potential Solutions:
 - Use/develop AI to uniformly assign hierarchies and classifications for categories that are accessible to all stakeholders. Use Ad-ID and EIDR as universal connectors. Determine if the IAB taxonomies are sufficient classifications for linear/video or if there needs to be a new set of classifications developed. Ask the JIC and OpenAP members to uniformly adopt the IDs and work with IAB standards for open watermark, ECID, and UCID to reference the Ad-ID and EIDR references
 - Develop common catalogs of all content [1.6]
 - Like BBMedia and others
 - Contract a company (like CCR) to generate a services that anyone could contract
 - How might IRIS.TV's process provide an operational backbone for this area?
 - Create Ad taxonomies and hierarchy (Brands, Parents, Categories) Work with Ad-ID to generate something that can be universally accessed. See if IAB Product taxonomy is a good base to assign from AI. [1.6]
 - Generate list of companies that create or manage metadata today and assess if there can be equally accessed by the industry.
 - Claravine (metadata), Hypha AI, Hive/Bain/GUMGum, any AI/ML company
 - Extreme Reach, for example has Ad metadata that could be put to broader use, or provide universal structure
 - Create a comprehensive Fingerprinting source for content Traditional and OTT, but not UGC. [1.6]
 - Consider a contract that is shared or sponsored with membership or license (like CCR)
 - Extreme Reach might be a good place to add operational steps that streamlines downstream costs

- Build the truthset of live schedules [1.6]
 - Programmers provide log files with administrative oversight into a schedule service (like they do to Nielsen today)
 - Sponsor a universal provider to generate comprehensive schedules
 - A company like CCR that monitors the majority of stations
 - A company that uses AI to identify breaks
- Common upstream technical standards can improve the quality of content identification [1.3]
 - There will be a cascading set of techniques for content identification. Watermarks are
 the most accurate approach and should piggyback on new (ad replacement) revenue
 use cases to justify adoption. The expense and time to market can be prohibitive.
 Fingerprints are faster to market but need to evolve for coverage, accuracy and
 efficiency. Al and instream data may provide opportunities, but can require app
 owner permission and OEM software.
 - IAB (Digital) and Broadcast engineers can align for whole system perspective by getting programmers to commit for cross-platform functionality – use tech and IDs that support both linear and digital
 - EIDR and Ad-ID can be more actively managed to enable democratized measurement by aligning with revenue requirements [1.6]
 - Consider established watermark workflows and providers to speed time to market [1.6]
 - Nielsen
 - Extreme Reach
 - Kantar/Advocado
 - Other?
- Identity [1.7]
 - ID framework —> Is there, or should there be an overview of the ID frameworks and how they are related?
 - Universal ID management/crosswalks. Most feel this is too hard to achieve and advise multiple points of triangulation and overlapping approaches to bridge all the providers
 - Share IDs across programmers (no incentive if used to cap freq)
 - Household graph devices and persons, room in the home, primary and secondary devices.
 - Is Conviva a good provider to anchor devices and smart TVs to hhs? Would publishers permit this summarization? Are companies still competing on access to the IDs? How is householding a competitive threat?
 - ID rotation solutions like RIDA from Roku. Obfuscation systems that assign IDs for targets and IDs for measurement that change over time or by client/user. Then also have legal guardrails. Double-blind + Noise services can provide an absolute set. Determine what the need to know is on each party and revenue requirement.
 - Common profile definitions

- Quality **[1.8]**
 - Validation services for correctness of 1P data
 - Test Lab for OEM TVs
 - Multi-device coincidence (2 sources of event data for the same behavior)
 - Fingerprinting method comparisons using AI/ML

Hypotheses Group 2 More Data for Measurement: Focus on bringing more data into the ecosystem will have the greatest long-term impact

- More data
 - More OEMs Samsung, Roku, Amazon, or others.
 - Add other methods of data collection [2.1]
 - Watermark, channel change, capture in stream data
 - (Subpanel) Panel partnerships [2.3]
 - A voluntary Smart TV device contribution to "whole home" Smart TV panel could be managed to support measurement initiatives
 - OEMs
 - Ask apps to contribute some data for a set of hhs or devices
 - Ask JIC to contribute a subset of app data from specific households to a crossplatform panel
 - Use HHs from VAB/ANA panel initiative (?)
 - ATSC3 data [2.4]
 - Consider a shared standard (like what Pearl and the Runs apps might do)
 - Ask Stations to pool certain data for sale
 - Consider cable networks implementing watermarks and pooling data for sale through the OEMs or a group of cable networks
 - More app data [2.2]
 - Ask Apps to permit measurement and reporting
 - Ask Apps to provide context to TV for reporting
 - Economics WIIFM [2.5]
 - Leverage addressable ad insertion to pull in more data for measurement
 - Buy-side collaboration should work to get more data into the ecosystem
 - Business model for data revenue and the value of the data
 - Address Trust and Privacy issues [2.6]
 - New privacy approaches can work in cleanrooms to bring more data into the market
 - Identity solutions that can respond and control insertions at the device without giving up privacy (think content-ad-UID whitelist pairings that can act at the point of ad insertion or implemented at the device)
 - Pledges and badges for privacy compliance might bring more trust and data sharing. CIMM could establish a voluntary privacy pledge for those entities that have implemented a suite of operational best practices that serve to protect consumers.

Hypotheses Group 3 Management: A cross-platform/industry collaboration, education, and administration can heal the fragmentation

- Educational courses on the full ecosystem can better align the industry for measurement **[3.1]**
- A documentation of OEM broadly adopted standards and capabilities could foster measurement and activation revenue.[3.1]
- Cross-trade group to facilitate agreements and drive adoption [3.2]
 - CIMM to take on the role of cross trade groups, standard definitions
 - OEM for ad products working group?
 - JIC tech implementation
- A financial impact analysis of bad metadata could help convince more parties of a WIIFM **[3.2]**
 - Similar analysis to this could help prioritize standards adoption: <u>https://www.claravine.com/calculator/</u>
- Business model strawman to showcase the revenue opportunity for data services. Data products are sometimes priced based on the number of households or devices, but these businesses often also sell inventory with premiums for enhanced targeting.
 - CIMM should provide OEMs basic revenue models to see the value of generating data and activation products and services. [3.3]
- Operational and administrative coordination of shared resources should reduce friction everywhere Ad-ID, EIDR, universal "AsRun"Schedules, **[3.3]**



Sample Interview Guide

Smart(er) TV Data for Measurement -- Sample Interview Guide

Surveys and Interview Guides – Name of Participants and Company Last updated:

OEM Interview Questions

With the decline in MVPD STBs, and Increase in CTV and OnDemand Activities, Smart TV Data is a critical component of understanding viewing behavior.

The goal of this project is to examine how measurement can be improved through Smart TV Data. We are asking folks to consider the whole ecosystem and their part, and how we can collaborate. Secondary emphasis to support the democratization of measurement.

For the sake of discussion and ideation, we are encouraging folks to think about upstream data, data collected from distribution points, data collected from device-level user experiences, and the information and techniques that are used to enhance and transform the data. And, opportunities to collaborate around standards, methodologies, workflow, and policies.

Survey Form and Interviews. Responses will not be attributed to a company or person.

Right to review your meeting transcript, redact or de-identify shared observations or activities, review the accuracy of materials that reference your company.

Name and Title and Responsibilities:

Participant 1 Participant 2

- 1. What is the scope of your current responsibilities at _____? Does it include data collected from _____ Smart TVs or connected devices outside of STBs?
- 2. How does viewer data and measurement fit into OEM BRAND business? Is there a high-level perspective that is good for CIMM members to understand?
- 3. Does _____ purchase any data for its own use?
 - a. What types and use cases?
 - b. How well does the data support _____ needs?
 - c. (Examples: DASH, DMA, Schedules, FP libraries)
- 4. Please can you provide a 30k foot view of your platform and the information it has access to?
 - a. ACR and ad/content serving?
 - b. Do you have a panel or other research instruments (surveys, for example)
- 5. Do you currently sell or license or provide access to this information today?
 - a. What types and use cases?
 - b. How are clean rooms used?
 - c. How do you manage identity?

- 6. Purchasers of _____ Data Services?
 - a. Does your company currently provide data to
 - i. Measurement services
 - ii. Agencies
 - iii. Programmers individually or as part of the JIC?
 - 1. Linear and app data? Adserving?
 - iv. Exchanges
 - v. Aggregators
 - vi. other
 - b. What are the Primary use cases? Any restrictions?
 - i. Open-ended
 - ii. Prompted (if needed):
 - 1. Currency
 - a. Ad exposure (ratings or impressions)
 - b. Person demographics
 - c. Co-viewing
 - d. Local
 - 2. Measurement
 - a. Cross-platform
 - b. Audience deduplication and incrementality
 - c. Content
 - d. Ads
 - e. Gaming
 - f. Addressable ads
 - g. Outcome
 - h. OOH
 - 3. Advanced Audiences
 - a. Activation and addressability
 - b. Data Integration Capabilities From First-Party And Third-Party Sources
 - c. Attribution
 - 4. Real time insights
 - 5. Competitive insights
 - 6. Optimization
 - 7. Behavior tracking
 - a. Content trends
 - b. Subscriber journeys
 - c. Brand tracking

- 7. How is the data collected? (non-STB,) Smart TV, Mobile other?
 - a. Ad serving
 - b. Pixel/tagging
 - c. Content serving
 - d. QoS
 - e. ACR
 - f. Al/ML
 - g. Watermarks
 - h. Other
- 8. What type of data are available? What are the key differences between information your platform has access to ?
 - a. Native applications (running directly on your platform)?
 - b. Devices (roku/fireTV/STB) connected via HDMI?
 - i. What information is different when HDMI
 - ii. Can you determine the Brand/OEM and MVPD of device?
 - c. Direct Antenna input?
 - d. How do ACR or watermark capabilities differ in the above defined scenarios?
- 9. Does OEM BRAND have the opportunity to evolve the technical standards used by the OEM partners to collect data?
- 10. What video and or audio watermark/fingerprint capabilities do you have?
 - a. What technology partners do you use for fingerprint/watermark detection? [Would a universal library reduce costs and increase coverage?]
 - b. Do the capabilities differ based on scenarios identified in #1?
 - c. Do you require the use of a camera or microphone to process video or audio watermark/ fingerprints?
- 11. How (well) does your platform identify or distinguish between Content and Ads?
 - a. Schedule alignment, match from ACR, watermark or other embedded standards
 - b. What are restrictions (capabilities, license, or cost) on your platform?
 - i. e.g. acr matching database only retained for X# of days
- 12. How do you make data from your platform(s) available?
 - a. Are there options you see that would make the process easier or faster to publish activity data in the hands of those asking for it?
- 13. In thinking about the standards for transport streams, for Smart TV Data, does your platform have capabilities to decipher and act on common upstream standards?
 - a. SCTE (35/104, 334/335), ATSC3.0, VAST4.x

- b. What survives encoding and broadcasting?
- c. What can be read?
- d. What can be legally used?
- e. EPGs
- f. AdID, EIDR
- g. have you heard of:
 - i. Open Watermark initiative
 - ii. UCID Extreme Reach IAB
 - iii. ECID IRIS IAB
 - iv. TAXI Complete
- 14. What is the most problematic for your platform?
 - a. Content providers stipulations for allowing ACR/Watermarking?
 - b. Some Digital companies and OEMs have suggested thatPrivacy/Government concerns are most problematic
- 15. Willingness to work with OEMs to establish different types of standards
 - a. Definitions and Descriptive Statistics about the footprint and coverage
 - b. Common Metadata
 - c. Metrics
 - d. Shared source library
 - e. Shared (Open) technical standards (open watermarks)
- 16. Review other the hypotheses
 - a. Standards
 - b. Contribution and Access to truthset metadata and common taxonomy source
 - c. Test lab with all OEMs
 - d. Sub-sample contribution
 - e. ATSC3 data

Will OEM BRAND discuss standards?

- Descriptive Stats Agree on terminology and communications
- Metadata (Ad-ID, EIDR)
- Metrics

Is a shared fingerprint source a good idea? More content captured and reported.

What is OEM BRAND's POV on ATSC 3.0 or other watermarking standards?

Meet/collaborate with other OEMs?

What do you think if there was an ask to support a subpanel?

Surveys and Interview Guides - Measurement

Last updated:

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For the sake of discussion and ideation, we are encouraging folks to think about upstream data, data collected from distribution points, data collected from device-level user experiences, and the information and techniques that are used to enhance and transform the data. And, opportunities to collaborate around standards, methodologies, workflow, and policies.

Survey Form and Interviews. Responses will not be attributed to a company or person.

Topics: Background, Uses, Challenges, Future use, Ideas

Measurement Company:

Name and Title or responsibilities:

- 1. What Smart TV Data does your company license and process?
 - a. Pick List
 - Vizio-Inscape
 - Samba
 - LG Ads services
 - Nielsen-Gracenote
 - Roku
 - Samsung
 - Other
 - None
- 2. Why do you (or don't you) license Smart TV data?
 - a. Open-ended
- 3. Do you use Smart TV data in all of your measurement products?
 - a. Yes
 - b. No
 - c. DK
 - d. If no, why not OpenEnded
- 4. Do you use Smart TV data for ads, content or both?
 - a. Ads
 - b. Content
 - c. Both
 - d. Neither

- 5. When you think of CTV and SmartTV data, do you include adserving data?
 - a. Yes
 - b. No
 - c. DK
- 6. Do you license, use or process adserver data?
 - a. Yes
 - b. No
 - c. DK
 - d. If yes, which ones? Open-ended
- 7. Do your products and services provide information generated by Smart TVs?
 - a. Digital Panel
 - b. Total Home Panel
 - c. Census tags
- 8. What are the primary use cases for products that integrate SmartTV data?
 - a. Pick List
 - Targeting
 - Activation
 - Match/Append data
 - Measurement
 - Currency
 - Planning-Optimization
 - Addressable Planning
 - Addressable Competititve Insights
 - Competitive Insights
 - Brand Metrics
 - Attribution
 - Inventory Forecasting
 - Subscriber Journey
 - Customer Acquisition, Churn, Sampling
 - Recency/Frequency/Duration of viewing
 - Content trends
 - Gaming Insights
 - Other _____

- 9. Looking at your use cases, how well does your SmartTV data serve your use cases? Score for each use case
 - a. Pick List
 - Targeting
 - Activation
 - Match/Append data
 - Measurement
 - Currency
 - Planning-Optimization
 - Addressable Planning
 - Addressable Competitive Insights
 - Competitive Insights
 - Brand Metrics
 - Attribution
 - Inventory Forecasting
 - Subscriber Journey
 - Customer Acquisition, Churn, Sampling
 - Recency/Frequency/Duration of viewing
 - Content Trends
 - App Insights
 - Gaming Insights
 - Other _____
- 10. What are the challenges you face using the SmartTV data?
 - a. Open-ended
 - b. Here is a partial list from others, which ones resonate?
 - One TV per household
 - Match rate on IP can be problematic
 - Incompleteness of content
 - Content and mode of viewing can be incorrectly identified, platform
 - Non-standard assignment for modes of viewing
 - Ads can be incorrectly identified (duration)
 - Metadata doesn't map to other systems
 - No validation of the tuning events

- 11. What improvements would you like to see from your provider?
 - a. Open ended list
 - b. Please rank those in terms of importance
- 12. Here is a list of improvement that have been suggested by others, would you rank them in terms of importance
 - a. Standards
 - Descriptive Terms and Stats for the data that is licensed
 - 1. Top number, In-use, Consented, Measured, Matched, Active (In-tab)
 - 2. Distribution of time captured
 - 3. Devices per HH
 - Some common measurements and definitions of metrics, modes and sources
 - b. Improved match and household graph Increase coverage of content and ads National and local
 - Access to comprehensive libraries for fingerprints
 - Access to source schedules
 - Watermarks for measurement (and activation)
 - Al
 - c. Improved metadata and universal taxonomies
 - Access to libraries
 - Adoption of universal IDs (ad and content)
 - Integration of universal IDs and source libraries
 - d. Validation lab for all providers
 - e. NEED More OEMs
 - f. Representativeness report
 - How different is the behavior across the OEMs?
 - What is driving the difference? If demo and room can be controlled.
 - g. Agreement for minimum universal app reporting need to ask providers
 - h. Additional data types from the TVs remote, personification,
 - i. Smart TVs could provide an insight to addressable ad spend by brands
- 13. What are the potential solutions that you think would help fill the gaps?
 - a. Open-ended
- 14. As we work on potential solutions, can you think of any companies that would be important to speak with?
 - a. Open-ended

- 15. What questions do you think we should ask of these stakeholders during this process?
 - a. Buyers/Sellers
 - Open-ended
 - b. Measurers
 - Open-ended
 - c. OEMs
 - Open-ended
 - d. Other data suppliers
 - Open-ended
- 16. How familiar are you with the technical aspects of content delivery across linear and digital such as encoding standards for the distribution of programming and ads?
 - SCTE
 - ATSC1 and 3
 - TAXI-Complete
 - Ad-ID
 - EIDR
 - ECID
 - UCID



CIMM Smart(er) TV Final Set of Slides CIMM Smart(er) TV Final Set of Documents