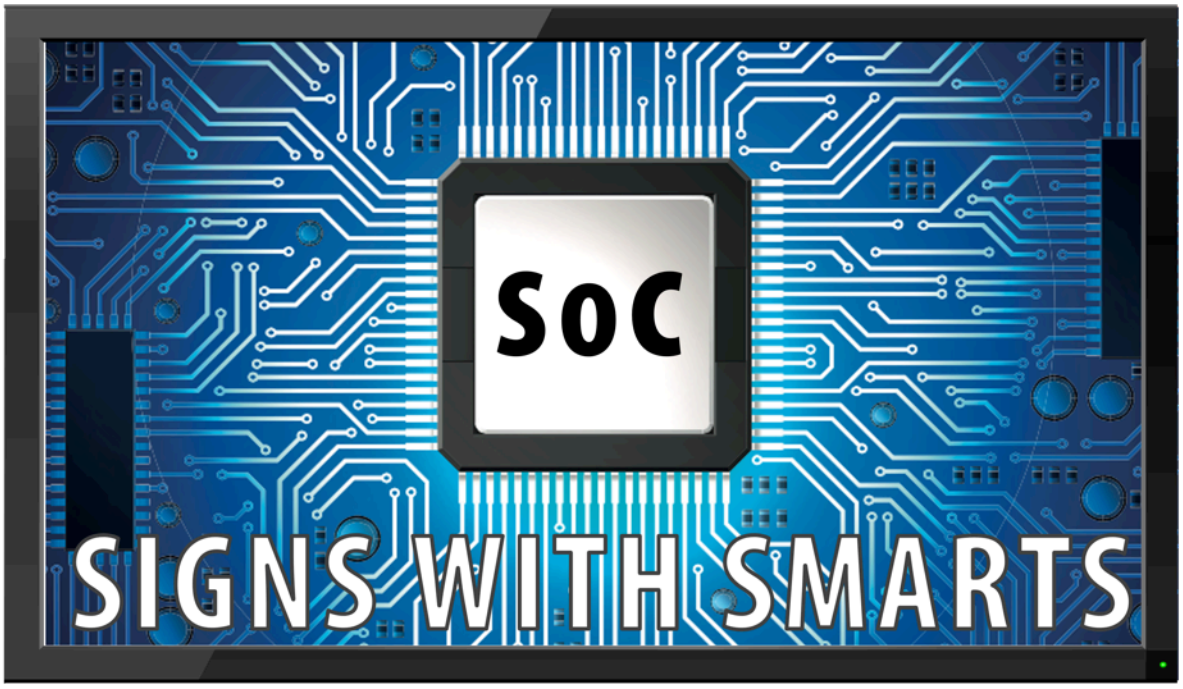
SIXTEEN:NINE

16:9 SPECIAL REPORT



ARE SYSTEM ON CHIP DISPLAYS THE FUTURE OF DIGITAL SIGNAGE?

MARCH 2017

PRODUCED BY VERTICAL MEDIA CONSULTING GROUP, INC.

REPORT SPONSORED BY: LG Business Solutions

INTRODUCTION

Are smart displays the future of digital signage, or is that future already here?

Most leading professional display manufacturers now ship digital signage displays with embedded System on Chip (SoC) players inside.

Display manufacturers and software companies both say the marketplace understanding and adoption of these "smart" displays is on the rise – owing a lot to dramatic improvements in performance, and better collaboration between stakeholders.

Most of these companies say the days of separate, PC-based media players are ending.

But many questions remain about smart displays – from their real versus touted cost-savings, their true capabilities and limitations, the challenges for software developers of an evolving product, and how this technology fits with the business goals of software companies, solutions providers and systems integrators.

Futuresource Consulting estimates 675,000 digital signage SoC displays shipped from all manufacturers in 2016, but only a fraction of those – as little as 10% - have the SoC "smarts" activated and used by operators. In most cases, they're still used as "dumb" displays, driven by PCs and media players.

This independent report looks at the rise of smart displays for digital signage and related applications, who is doing what, and the future of smart digital signage displays. This special 16:9 report was developed with the help of display, software and research companies.

LG has kindly sponsored the report, and a clearly marked advertorial feature from LG is included. But the editorial content here solely reflects my own observations and the opinions of dozens of industry people.

Dave Haynes, Editor, 16:9
March 2017

SIXTEEN:NINE

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A Brief History Of Smart Signage Displays

Integrated panels with SoCs and pre-installed Android software first started showing up at trade shows in 2011-2012, marketed by tiny and unfamiliar manufacturers from Taiwan and China's Shenzhen electronics hub.

It was not until early 2013, however, when Samsung announced its Smart Signage program, that the digital signage ecosystem started hearing about and seriously looking at the idea of SoC displays.

The first generation did little more than play back jpegs and basic video because of their limited processing and graphic power. In plain terms, they weren't very good at digital signage, and a lot of the companies that tried to work with the displays, backed off.

Adoption among those software partners was also limited by skepticism about the manufacturer's long-term commitment to a nascent product and platform, and the somewhat proprietary, restrictive applications that developers had to work within.

A second generation with faster processors and more software capability followed a year later, and by 2014, Korean rival LG launched a rival product, running LG's webOS for Signage.

Both Panasonic and Philips debuted their own SoC display lines in 2016, as did Viewsonic and Turkish display manufacturer Finlux (Vestel). In early 2017, Sharp and Toshiba also introduced SoC displays.

Sony has networked connected displays that have an HTML5 player embedded, and support Android TV, but do not have development platforms for CMS companies.

NEC remains the only major display manufacturers active in digital signage to not add an SoC product to its line-up. However, NEC has for many years had certain displays available with slots to snap in small Intel x86 computers or an Android player. In 2017, added a Raspberry Pi single-board computer module that fits in the back of select NEC panels.

SoC Display Basics

The typical kit of parts for digital signage projects includes a PC or other media playback device, like a set-top box, that plugs by cable into the back of the display. With System on Chip (SoC) displays, the playback device and its cables are replaced with an integrated circuit that puts all the typical components of a computer on a single chip, mounted inside the enclosure of the display.

SoC devices have been around for many years, used primarily in the embedded systems market for industrial applications. In recent years, SoC devices have been behind the rise of smartphones and tablets – built with enough processing power to run operating systems like Android, iOS and Windows Mobile.

SoC display devices have much in common with the devices used in consumer-grade "smart TVs" and, in fact, smart TVs pre-date the arrival of commercial-grade SoC displays on the digital signage market in 2013.

The idea of all-in-one commercial displays is not new. Several display manufacturers had earlier developed and marketed display products that conformed to the Intel-derived Open Pluggable Specification (OPS), which involved slots built into displays that would accept snapped-in Intel-based PCs.

Intel has recently released a mini-OPS specification that allows for PCs with a smaller overall profile to fit in displays supporting that spec, as well as a single board computer module that could fit into a port or bay on the back, or side, of a professional display.

Most of the SoCs on the market run some version of Android or Linux, which is the foundational operating system for Google's Android OS. Samsung had used a proprietary operating system in its early Smart Signage models, but has now standardized with its 4th generation on its own Linux-derived operating system, Tizen.

LG uses its own Linux-derived webOS, which was originally developed as a mobile OS, and is used on its Smart TV platform.

The other manufacturers use contemporary versions of Android.

There are no SoC displays running Windows or MacOS.

WHO'S DOING SOC – DISPLAY MANUFACTURERS – Q1 2017

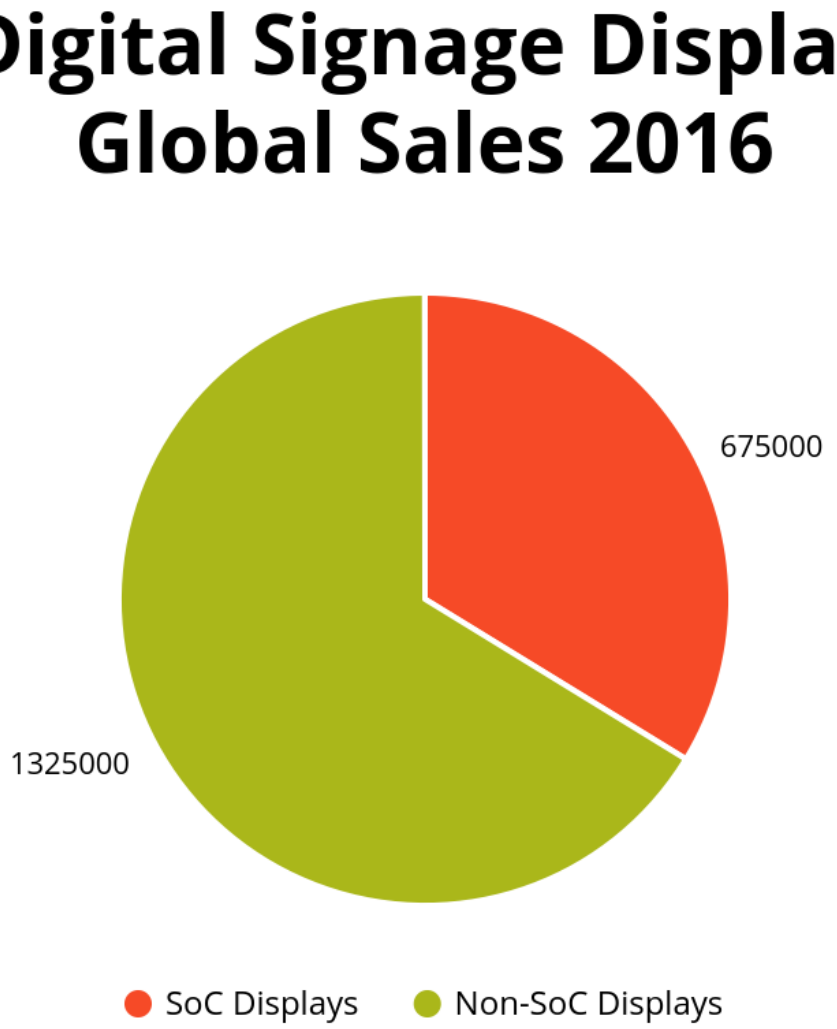
COMPANY	WHEN LAUNCHED	SOFTWARE (OS)	LINES SUPPORTED
Samsung	2013	Tizen OS	Most pro series
Sony	2013	HTML5 only	Bravia series
LG	2014	webOS	Most pro series
Panasonic	2016	Android	AF1 series
Philips	2016	Android	All going forward
Viewsonic	2016	Android	CDM series
Finlux	2016	Android	Several series
Sharp	2017	Android	All going forward
Toshiba	2017	Android	One series

WHO'S DOING SOC – CMS SOFTWARE COMPANIES

When the first generations of SoC displays came on the market, only a handful of companies allocated substantial resources to SoC to fully integrate their software platforms. Another, relatively small group of companies "got it to work" with the simplified, Web-based versions of their product that use HTML5 and cross platforms relatively easily.

Now there are 100s of companies, globally, offering solutions that fully run on SoC. Often, these companies have developed flexible solutions that have been designed to work across multiple SoC manufacturers – instead of being restricted to just one.

SOC BY THE NUMBERS



Source: Futuresource Consulting
(excludes videowall and interactive displays)

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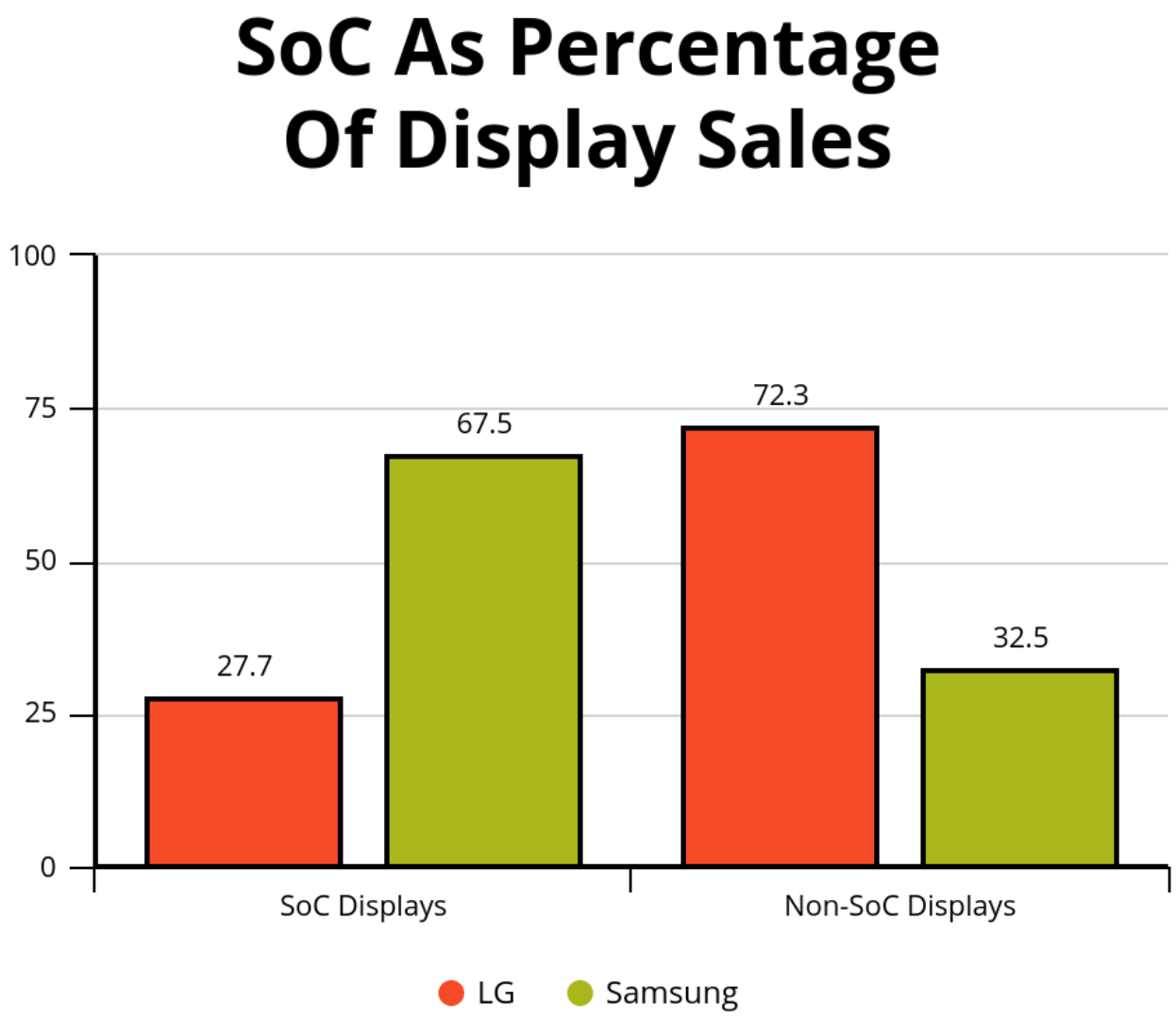

Source: Futuresource Consulting - 2016 data

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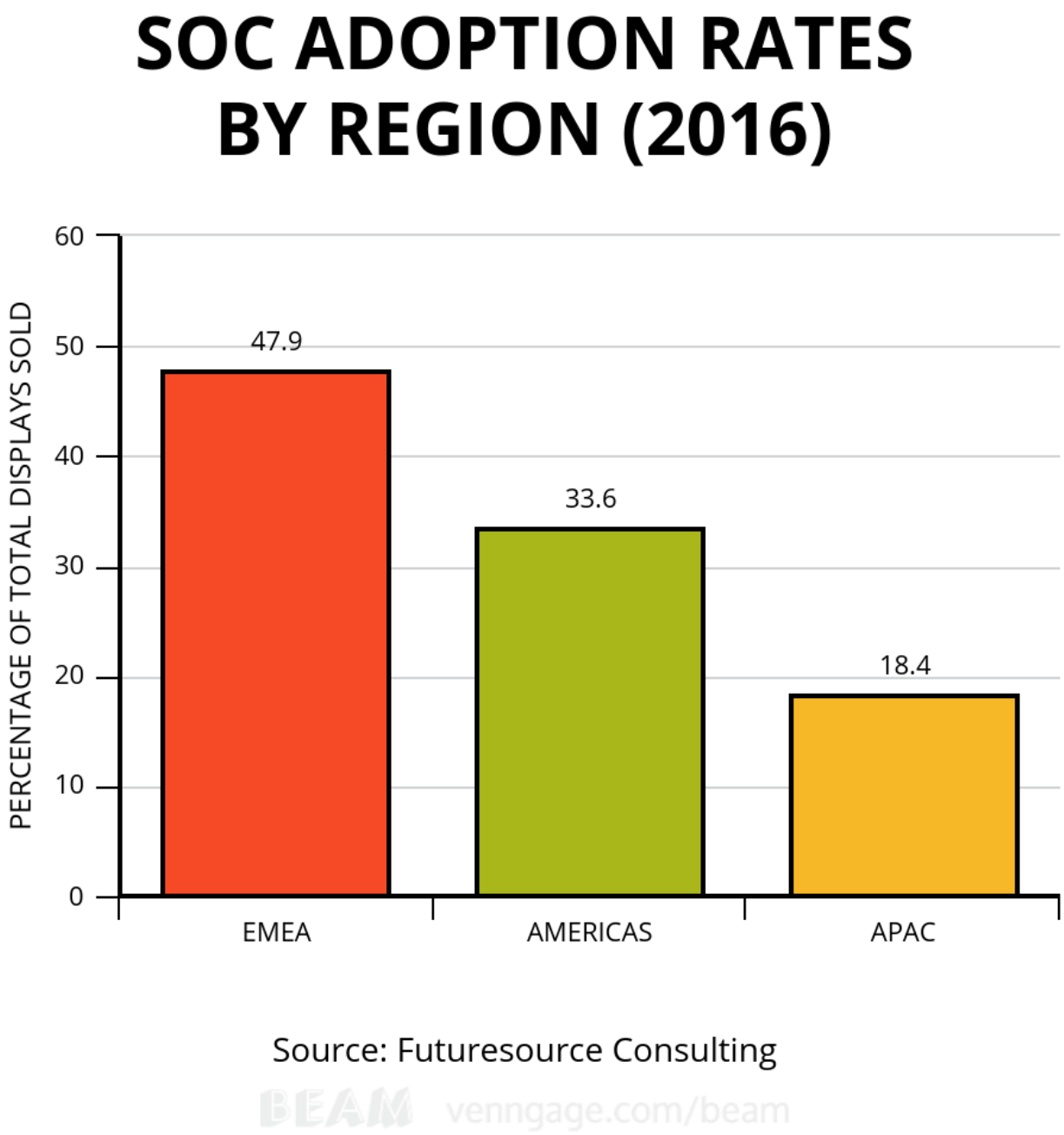


Business Arguments

The business argument for smart displays has always come down to two things – cost reduction and ease of installation, which also has reduced cost implications.

A typical digital signage configuration involves a display, with content provided by an Internet-connected PC or media playback device. The content is sent to the screen by some sort of signal cable. A smart display, by comparison, has the media player embedded inside the display, as well as the connectivity.

That means a separate media playback device – costing anywhere from $60 on the low end to $700 at the higher end – is no longer needed. The signal, management and power cables for the player are also unneeded. And the mounting hardware doesn't need the additional metalwork of a secure cradle for the player.

So a "smart" display can, in theory, remove a lot of cost from capital budgets, and enable tidier installations that might need just a single power cable for the display.

"If you are a systems integrator and you are going to deploy 500 media players," explains Navori CEO Jerome Moeri, a Swiss CMS software firm, "using System on Chip, you may save up to $300,000 US dollars, which is quite important."

Samsung commissioned a third-party study after it launched its Smart Signage SoC series. "It showed a 30%-35% reduction in Total Cost of Ownership," says Kevin Schroll, Director, Digital Signage Product Group at Samsung. "Only part of that was directly related to the cost of the player, and with that, we weren't assuming a $500-$700 player. The study was assuming it was a $200-$300 player."

There are additional costs associated by embedding and integrating an SoC in displays, but for mass manufacturers who move product by the container ship-load, the SoC hardware likely amounts to an extra $15-$30 extra that's usually buried in the overall panel cost.

The total cost reduction, the study found, was roughly half due to reduced player costs, but the balance owed to less cabling and mounting hardware, and lower installation labor costs, because of the reduced complexity of putting screens in.

The total cost argument has also been used as a case against all-in-one SoC displays – with opposition framed around the risks, lost opportunity costs and added labor that would be required in the event of the processor failing.

When a digital signage PC or media player fails in the field, field service and replacement is quick and easy. One small player box can be easily swapped for a pre-configured, pre-loaded spare in a matter of a few minutes. But when a smart display fails, the whole unit has to be de-installed, packed up and shipped to a depot for repair or replacement.

It's a valid theoretical concern, but the experience over four years at least suggests the reliability on the solid state SoC units has been high, and field outages a non-issue. Numerous software companies were asked about their experience with reliability, and none indicated problems.

"That's generally not the area where something fails is the processor," says LG's James Pfenning, National Account Manager, Digital Signage. "If we have a failure of a display it's a power supply or LED related - the back-lighting or something. It's a valid concern, but I think once people understand the stability of the actual chip, it kind of goes away."

Samsung says its failure rate for SoC displays is just 0.3%.

Working With SoC

The first generations of smart displays came from Samsung and LG, and in both cases, required a substantial investment by software companies in time and developer resources to integrate their Content Management Systems with the devices. Both Samsung and LG required software developers to learn and work with proprietary systems.

For CMS software companies that use web browser technologies as their playout engine, making a smart display work with their software could be relatively easy, as elemental as scheduling a URL and running their signage application like a web server. But for software companies wanting to fully use their CMS and player capabilities and have a "native" player (not just the browser), much more development time was required.

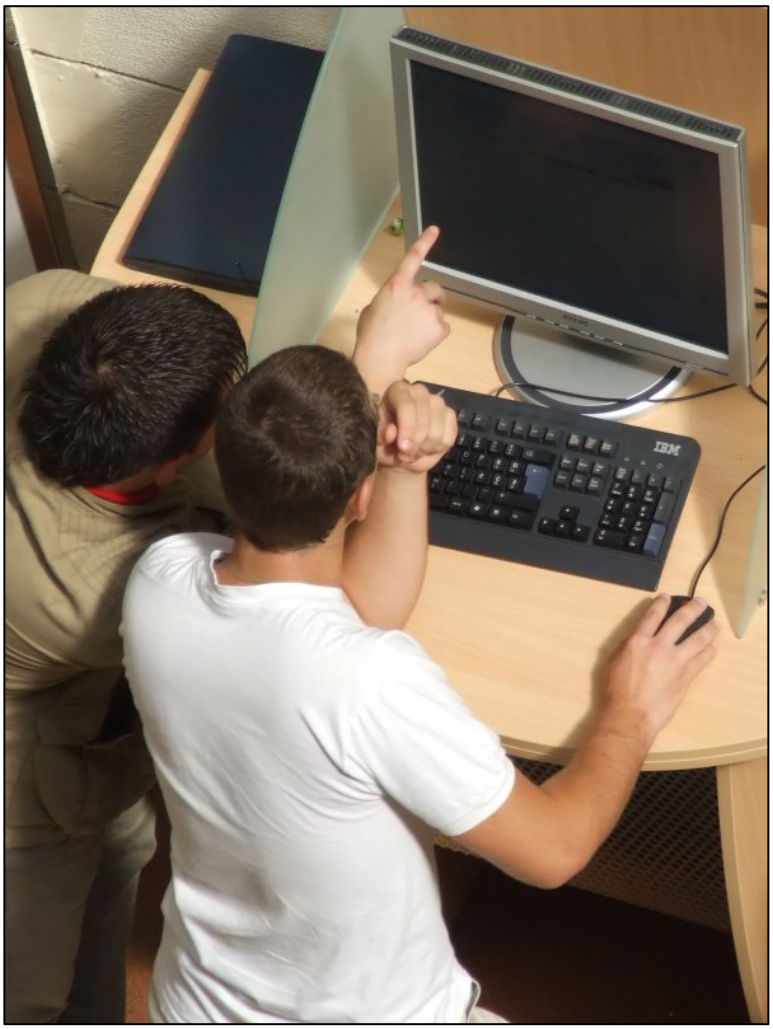
What the early adopter companies wanted, along with those who steered clear, was a more (or fully) open set-up that allowed them to "port" development they'd already done for Android media player boxes, and then just "tweak" that code for the SoC versions.

There were issues with the lack of good developer information, and with versions of the manufacturer's base SoC code that broke the CMS companies' own software tuned to the displays. That was an issue already familiar to companies that tried to stay on top of the rapidly rolling software versions of Android.

There were also issues with the stability of the early SoC platforms. Displays running their players would, for example, suddenly shut down and reboot, without notice or reason. There were noticeable time gaps between back to back videos.

Since then, the companies entering the smart display market have tended to offer “open” Android SoCs that provide friendly, familiar development – and this has been helped by the maturation of Android and, particularly, its web, video and graphics capabilities.

Philip Chen, Senior Business Development Manager at Samsung, says his company knew its first generation of displays was limited in capabilities and what it offered software companies and customers. “So within that next year, we had a new chipset out, and we had new capability to do remote diagnostics and remote management. And that was a huge step forward,” says Chen.



“And then, as we're continuing to evolve the platform, and understand what the marketplace wants to do, it was really about trying to be a slimmed compute environment, whereas CMS's back in 2012 were just all about playing back media,” says Chen. “So we're evolving really quickly, and likewise, a lot of it was built on the demand, and the feedback that we're getting back from integrators and customers.”

“Without naming names, In our experience some vendors are better than others in providing the technical and developer materials needed to support software development, and this obviously slows our progress,” says Simon Carp, Senior Product Manager of CMS software firm ONELAN.

“They’re very friendly people,” says a software CTO, relating his deep frustrations working with a Korean manufacturer, “but they're very disconnected from whatever the mothership does, and the mothership is not very connected to them either.

All the manufacturers I spoke with seemed to recognize the importance of collaboration and not forcing or expecting software firms to just work with what they get.

“We're trying to be responsive but I think it's a little bit of a learning curve for us, as well” says Pfenning. “Something I've recognized is that now, since we are the media player and display together, we need to continue to be involved long-term with our partners. In the past, as a new media player was released we were not part of that discussion and part of that evaluation, certification, making sure nothing got broke, making sure it works.”

“Now that's on us, so we're part of those discussions of working with the CMS. If we launch a new version or if they make a change, we need to be with them. If the end-user experiences an issue, we need to figure out - is it us or is it them?”

“I think SoC is the future of digital signage, because you have to put everything in a box and make it simple,” says David Keribin, of the French CMS software firm CityMeo.

His development team found that, for a long time, working with SoC was anything but simple, and there are many limitations. “But we watched, and now I think SoC has improved a lot, and we can use it.”

Even a steadfast Windows shop like Omnivex – one of the oldest software companies in the ecosystem and widely regarded as having among the most sophisticated platforms – is now working with SoC.

“Omnivex has investigated this technology in the past and was involved actively with vendors from the early inception of the technology,” says Jeff Collard, the company’s President. “In our opinion, early versions of the technology, while promising, was underpowered for the customers that we support. The technology has recently advanced to the point that we feel our customers can leverage it for certain applications. We are actively engaged with several display manufacturer to ensure our latest platform - Omnivex Ink - works with their latest hardware. Omnivex Ink will be formally launched at DSE 2017 and we will be demonstrating on some SoC displays in the booth.“

Conflicting Software Options

A software company considering SoC displays as a platform of choice is confronted by at least three different development paths – LG webOS, Samsung Tizen or Android. And with Android, different versions of that that operating system that may support different capabilities.

The platforms offered by both LG and Samsung are somewhat proprietary and have their roots in other systems. The webOS software started years ago as Palm's mobile operating system, and is now the core for LG's global smart TV platform. Tizen is Samsung's own open-source OS intended to work across multiple devices, from TVs to wearables.

Developing to these platforms means learning the new system, particularly as it relates to the controls and management of the displays. There's a learning curve, and weeks or possibly months of developer resource investment needed to go live on these platforms.

"About 80% of what a provider needs to do is common between a number of different operating systems, so there are a lot of standards that can be used," says LG's Pfenning. "We're only talking about 20%, give or take, that is proprietary to webOS, in that it's the commands and the controls to relate to LG's hardware as much as it is webOS."

"There are, I guess nuances," adds Samsung's Chen, "because when you take a look and you develop strictly a native app, it is different than developing for the SSSP. And this is one of the nuances. SSSP is built on JavaScript and HTML5 languages. That's pretty open source, for the most part. And what we allow developers to do is utilize specialized APIs to tap into the hardware-specific commands and controls - such as on or off, picture in picture commands, even remote diagnostics or going right into the file system. So those are all computing level APIs that could easily be, I would say, achieved."

"When we get to the right people and if they have the experience with SoC, once they get into the development portal and see what we're doing, what's needed and what's capable, it's not too intense," says Pfenning. "We've had some partners develop in less than a month, port over to our platform. So it's really not as monumental, just because we're under a different operating system."

Companies such as Panasonic, Sharp and Philips do not have proprietary operating systems, and instead market smart displays that run on Android and offer a system that is open and friendly to software companies that already have experience developing solutions for Android-based media players.

Each system has its unique elements, but Frank Racapé, EMEA Sales Director of Philips, says development and integration tends to happen quickly. "To be really honest," says Racapé, "I've seen that, most of the signage software who have already been working for a long time on Android, they are just receiving one of our products, opening the application, and it's working straight away."

The Dutch CMS software firm NDS has been working with several smart display manufacturers since 2014, and decided to get around the quirks of the different OS

options by creating a generic HTML5-based solution. But the company's developers found that was easier planned than realized, so NDS decided to invest in development and integration using the programming kits (APIs) specific to manufacturers, says Bjorn Pieper, the company's Chief Commercial Officer.

"This now has resulted in stable and easy deployable solutions in which we have, per display manufacturer, a native application that is largely based on the same generic code," explains Pieper.

That's the path taken, as well, by UK-based CMS software firm Signagelive.

"We have built a modular SoC Player that allows us to plug in and utilize the vendor specific SDKs and capabilities," says CEO Jason Cremins. "We have implemented all of the available functionality provided by the manufacturers, to the point where our SoC offering now accounts for over 60% of our new license activations."

The CEO of one of the largest CMS software firms in digital signage, Denver, Colorado's Four Winds Interactive, suggests the manufacturers would be better served setting on a standard instead of putting a range of options in front of developers.

"If SoC solutions were pure Android or ChromeOS, I think they'd see a lot more adoption," says David Levin. "With proprietary platforms, I think it's going to be hard for them to keep up with Google, Microsoft, or Apple. I don't think the world needs yet another platform to develop for … at least from a software company's standpoint."

"I feel that it ebbs and flows," says Pfenning. "I've heard providers say, 'We're gonna do Chrome,' or 'We're gonna do Android,' or 'We're gonna do webOS,' or our other competitors. But then they'll come back and say, 'You know what? We're done with the Android thing. We're gonna move on because version control is an issue with Android …' "

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LG webOS 3.0 A New Smart Platform Of Possibilities

The 3rd generation of the LG webOS smart signage platform opens a broad spectrum of possibilities for using intelligent displays to improve communications.

Displays shipping with system on chip processors, running LG's webOS 3.0 smart signage operating system, have the multimedia capabilities and critical management tools to address enterprise-class requirements.

LG displays shipping with webOS 3.0 span a range of typical digital signage display sizes for high-end and mainstream Full HD and Ultra HD LCDs, as well as LG's stunning new commercial OLED displays.

Introduced in 2015, LG webOS for digital signage has seen steady progression with each version – with 3.0 bringing a series of new capabilities and features, including:

- Support for multiple concurrent videos;
- UDP, RTP, RTSP video streaming;

- Gapless video playback;
- Chromium webkit browser for improved HTML5 support;
- Built-in Bluetooth low energy beacons, with iBeacon and Eddystone support;
- JS (node.js) service and broader APIs via SCAP 1.4;
- Extensive remote management tools;
- Web camera video conferencing support.

“All of these things are pointing to significant growth in this area, right now, and I don’t think that’s just us drinking our own Kool-Aid,” says James Pfenning, LG National Account Manager, Digital Signage “It’s really a shift of the end-users and solutions providers coming to us now, because they like what they are seeing with webOS 3.0 and they know they’ll get the attention and support they need to be successful with their digital signage projects.”

The webOS 3.0 platform is a parallel version of the same webOS platform that’s driving all of LG’s smart televisions around the globe – with a large development team and software partners around the world. The signage version of webOS allows software developers with content management or other applications to develop high-impact visual communications projects.

By using LG webOS displays, signage network operators eliminate the cost and complexity of a separate hardware media playback device, and streamline installations by consolidating everything needed for a digital signage network inside the display – with just a single power cable connected in the rear.

LG webOS displays are already being used by retailers, food service operators, building managers and corporate communicators to deliver real-time messaging and visuals. The latest generation 3.0 displays are opening more possibilities.

“A shift we're seeing takes webOS 3.0 beyond traditional digital signage applications,” says Pfenning. “There has been a jump in interest in applications and providers related to video streaming. Some of the companies that do signal distribution, they can potentially eliminate that box on the receiving end and utilize the system on chip.”

The partner eco-system for webOS signage has started to grow dramatically in the past year, with more than a dozen CMS companies in North America and more than 100 globally.

“2016 was an amazing year for us, with LG taking over the number one spot in market share in North America partway through the year,” says Pfenning. “That's led to a number of other things converging in our own organizational structure, and our emphasis on innovation. You'll see that at our trade shows. We’re trying not to be just that value commodity product but showing real value with innovation. All of those things are kind of coming together. The market sees a company that's being successful like that. When I go into discussions I'm definitely pointing to that, showing that we are a leader. We're driving the industry.”

More Horsepower

The early versions of System on Chip displays were underpowered for all but the most simple digital signage applications – functioning as digital posters with minimal motion graphics. Samsung's first generation appeared to ship with processors seen a year earlier on its Smart TV lineup.

But that has changed across most or all of the manufacturers, and the latest generations of these smart signs are regarded as being at par or even better than the sorts of modestly-priced, small form factor PCs used for many digital signage jobs.

"The quality of System on Chip is now slightly better than PCs," says Navori CEO Moeri. "They are powerful enough to have better quality than a PC, especially on video playback, because they use mobile processors, which are more efficient for video rendering."

Generally, the software companies contacted for this report say hardware performance has improved dramatically from earlier generations, and that the SoC displays being marketed in 2017 no longer compromise the quality of media play-out. Some manufacturers have even introduced dual processors on displays to optimize performance.

Specs vary, of course, by manufacturer – with some putting in beefier processors than others. Undoubtedly, there are SoC products that remain underpowered and unsuitable.

"We do advise to be careful in selecting the hardware," says Pieper. "We have seen quite some difference in quality, performance wise but also lifespan wise."

Increased Security

Because Android and the other operating systems being used in SoC are open-source, one of the concerns and objections routinely raised by end-users focuses around network security.

Some IT teams have said they operate in secure Windows environments and Android and other Linux-derived operating systems left them nervous.

“We’re also seeing security requests come through that ask us, are we talking about a PC?” says Samsung’s Chen. “And being SOC, it's neither PC, nor a traditional TV. So that we don't have to think about this as a Windows-based system, or a Linux-based system, and then go through the security protocols that are required to secure that kind of desktop, or PC player, because this is an application that's like an appliance. It's specially tuned to just do its thing, and to lock out any of the other functions that a traditional PC would be vulnerable to.”

Philips’ Racapé says network security comes up regularly in partner and client discussions. “We do a hell of a lot of work from a security perspective, and we make sure that whenever we talk to end-customers, we are able to demonstrate security aspects.”

Security and management are so central to Philips’ offer they pre-install a version of the network management and remote access tool TeamViewer on all the SoC panels it ships.

PCs Fight Back

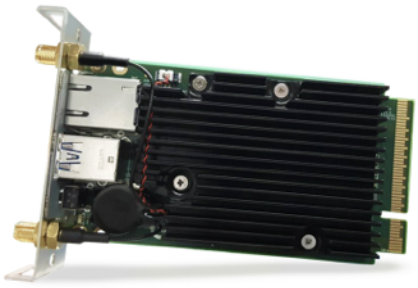
The combination of low-cost standalone Android players and ostensibly zero-cost embedded smart displays was not something chipmaker Intel could just ignore.

Much of the signage ecosystem has grown up and runs on Intel-based x86 computers, and lower-cost ARM processors are or certainly will put a dent in that.

Jose Avalos, who for many years has built up and run Intel’s digital signage efforts, has his doubts about how many ARM-based SoCs that have shipped are actually being used as media players. “The analogy that I would say is like Bluetooth in cell phones, right? The utilization of Bluetooth in cell phones is actually really low,” says Avalos. “So, in this case, it's kind of an analogy, but it's what's happening to some extent in some of those parts of the market where people are integrating very entry-level SoCs that allow you to enable really dumb digital signage.”

“If that's what you need, well that meets your needs,” says Avalos. “But if you want something to be interactive, something to be remotely managed, if you want to collect analytics, that solution doesn't work.”

There’s clearly enough going on with SoC – regardless of what it can or cannot do – that Intel announced its counter-product in Feb. 2017. The Intel Smart Display Module is a single-board computer module that can be plugged into the back of manufacturer displays that create a port that meets the specification.



Intel had already done something similar – a reference design called the Open Pluggable Specification (OPS) – that allowed the slot-loading and removal of small form factor PCs into the back or side of displays. This new module is similar, but dramatically smaller - like a small stack of credit cards, plugged in by a PCIe slot.

“The SoC guys are focusing on sub-entry digital signage. Right? What we're going to do, is we're going to drive in solutions at the entry-level, at the mainstream, and at the high-end,” says Avalos. “So you'll be able to integrate a media player, regardless of performance.”

Intel says the module will start at entry-level Atom processors and go all the way up to a high-end Xeon processor. “So, you're going to be able to have your basic digital signage, and you'll be able to have mainstream digital signage that can be remotely managed. It can run analytics. And then you'll be able to have signage for large form of displays or for video walls.”

The wild card here is cost. The primary attraction of SoC displays is the elimination of the cost of a separate display, with the understanding there is some nominal extra cost built into the smart display price. If the Intel module is competitive with in cost with an SoC with similar horsepower, that could be attractive to developers that have remained in the Windows and/or Linux x86, and don’t want to shift to Android or a proprietary system.

It the costs are similar to external players, however, the marketplace will determine if it cares that much whether the computer is built in the display or tucked behind.

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Selling SoC

When “smart” displays first entered the digital signage marketplace, they were marketed as new and somewhat unique technology that cut costs and streamlined installations.

But four years on, with numerous manufacturers marketing their version of the same thing, it’s a different proposition.

In certain respects, the platform doesn’t need so much to be “sold,” because it is now standardized across multiple product lines for the largest commercial display makers. If you buy a 16/7 or 24/7 flat plat panel LCD display, it likely ships with SoC.

So the argument has turned to selling on the specs and features, size of the partner community and ecosystem, support and the companies, as a whole. One of the arguments LG makes is that its webOS is not a “skunkworks” sideline project that may or may not continue. That operating system is steadily and heavily being developed for the much larger production and user base of smart TVs.

LG’s Pfenning also says he coaches his sales people and their extended partner systems to not just “sell” SoC as a thing. “They need to always identify what the need and from a content and all the other factors that go into the solution and then present the right solution for it,” he says. “If System on Chip is right, that's great. I caution them from painting themselves into a corner where they lead with a System on Chip solution and then it doesn't perform to what the requirements of the application. And also, we want to also recognize there's a number of awesome CMS providers, and great partners of LG, that are not on our System on Chip and we're not intending to alienate them.”

It’s an interesting point. For all the perceived cost benefits of SoC, the partner base is heavily populated by start-ups and smaller established software firms that have at least a couple of things in common:

- web-based, cloud-based systems that adapted pretty readily to SoC:
- a need and aspiration to draft off the exponentially larger marketing muscle of the major display companies.

It's why the larger trade shows in the industry – Integrated Systems Europe, InfoComm and Digital Signage Expo – all see display manufacturers co-locating numerous software vendors in their booths. Many or most of these companies don't have the balance sheets to support getting their own exhibits at large trade shows. They also have limited sales resources, so leveraging the much larger sales and marketing effort and budget of the display companies is seen as one way to raise their profile and drive business without blowing their budgets.

Companies such as Signagelive have thrived by being early adopters of SoC and working very closely with the different display makers. Few others have made much of an impact, to date, with SoC.

Not everyone sees this co-marketing strategy as sound. Chris Riegel, CEO of Dayton, Ohio-based STRATACACHE thinks software companies that are aligning their product and marketing efforts with display manufacturers are crazy.

"I think that any software vendor that puts their platform onto SOC is signing their own death warrant," says Riegel, whose CMS, hardware and services company is the largest (and likely most financially successful) in the digital signage ecosystem. "You go to the LG booth at a trade show. You go to the Samsung booth, and it looks like one of those cattle feed lots with their partners."

"It absolutely, positively liquidates the value of those software brands, and they're a commodity," says Riegel, explaining partner programs just lump companies together. "I don't want to be one of 15, or one of 20. (The display manufacturers) get the brand value of access to our customers, and what do we get in return? Nothing. And you damage that brand fundamentally."

He also sees opting in to SoC as a tactical mistake for integrators and their clients, because they are surrendering the ability to buy flat panel displays as a commodity. He says STRATACACHE and its newly acquired sister companies, Scala and Real Digital Media, can make LCD procurement decisions based purely on prices, availability and base specs, without worrying about the SoC and software integration.

"So I have no extended ties that would keep me from being in a competitive environment," says Riegel. "But year one, I buy Samsung. Do you think your year two price

on Samsung's going to get better? Because they know they've got you at that point. The buyer in that environment is making a tactical mistake."

Photo: Signagelive

Who Is Buying SoC?

Early versions skewed heavily to simple requirements like digital menuboards and digital posters in fast food ands retail, but the user base has broadened as capabilities and options have grown.

The same vertical markets that are driving overall marketplace adoption rates of signage are also applying to SoC panels: QSR, retail and corporate communications. Wireless carrier Vodafone's Australian retail estate has, for example, roughly 1,000 smart screens on its shopper-facing retail network.

But one of the attractions of platforms that are driven by web services and HTML5-based is the ability for developers working outside of the mainstream digital signage ecosystem to extend what they do for online and mobile to a new kind of screen and end-point.

Smart TV developers can extend applications, for example, to smart signage needs – creating functionality apps that can be activated and used for business marketing purposes.

It also makes it easier to get business information in front of more people, easily.

“A lot of the applications that we're starting to see now are what look and feel a lot like a data appliance,” says Samsung’s Chen. “Whereas we've got customers who are asking about dashboards that are already web-based and web-built. You know, built for the web and built to be viewed a web mobile device. And now they're asking, “Well, can I just display it on an SOC monitor?’ And, sure enough, that's all that they're looking to do. So in those applications, there is not what I would consider rich media, or heavy media, or interactive … it's a data display.”

However, research suggests and the manufacturers concede, a lot of the SoC stock being shipped is being driven by external media players, and the smarts inside are not getting used.

“Anecdotally, we have heard that as low as 10% of displays that have System on Chip included actually have that chip used,” says Graham Cooke, a pro display analyst with the UK-based research firm Futuresource Consulting. “From our discussions with integrators and distributors, again anecdotally, they always encourage using a dedicated media player for signage, rather than the SoC, as obviously they make larger margins on additional dedicated players, but also crucially if a media player fails, it is far easier to swap it out rather than having to take down a display and put another up.”

LG’s Pfenning says 10% may be accurate, but sees an uptick happening. “We started to see, second half of last year, a shift to where they're using it. We're just the development platform, so we are reliant on these solution partners to create applications that are robust and that are worthy for the market. Then the next step is to get them out there.”

Samsung says the usage-rate has climbed to the point that they believe about half of the SoC displays they're now shipping are actively using the smart features.

Futuresource says its 2016 data shows 67.5% of Samsung's volume (again excluding videowall and interactive) for 2016 has SoC included, while LG – the #2 global brand for pro displays, did 27.7% of sales with System on Chip included.

Geographically, says Futuresource, Europe and the Middle East (EMEA) leads the way for SoC adoption, with 47.9% of all sales in this region having SoC integrated. Americas follows with 33.6% and APAC trails with on 18.4%.

"Since the launch of SoC products, it had been expected that developing countries would take to this basic signage a lot more than developed countries. However, this has not proven to be the case. In developing countries," says Cooke, "there is a much less mature integration and distribution network, whereas developed countries have a lot stronger, evolved network, which are able to understand and actively promote and push the benefits of SoC."

"In many developing countries, television products are still preferred (mostly for cost), with very basic signage solutions attached to them," he adds. "In developed countries, SoC Solutions have been utilized in SME environments where a single screen or small network might be used, but less so for the SoC capabilities in large networks. "

"Of course, the actual displays are used still for large networks, just with dedicated players and servers, able to carry out the tasks to a better level."

"I can tell you, with certainty, the trend is moving in System on Chip's direction because the end-users, first and foremost, are the ones asking the questions," says Samsung's Schroll, "and they're asking to simplify the digital signage value chain."

End-users want, says Schroll, a simplified solution. "We're getting questions from end-users. I mean big end-users. I'm talking 5, 10, 15, 20 thousand deployments, asking those kinds of questions."

Display companies and their software partners rarely talk about sales volumes and license numbers, and that's the same with SoC. But there's this from Signagelive, which has

arguably been the most active and aggressive partner and marketer of its SoC integrations: “We have 735 networks in 27 countries across all sectors now utilizing SoC displays,” says CEO Jason Cremins. “SoC Displays are 100% fit for the middle 80% of the market, and the offering will only get more compelling as the vendors increase performance and external device support.

Conclusions

With all of the major commercial display manufacturers including SoC in their standard build across part or most of their 2017 line-ups, it’s no longer a debate as to whether embedded displays are a passing fancy or the real deal.

At relatively nominal extra cost per display, it’s likely easier for manufacturers to standardize on the capability and then let end-users decide whether they want to use it, or stick with using separate media players.

Neither is a bad technical choice now, with the proviso that just as some small PCs are better than others – even at the same price points – the same likely holds for SoC displays.

Much of the attraction of SoC continues to be about budget, and the perception that these displays can save $100s because an external playback PC or box is no longer needed. However, it’s possible to get capable media players – running ChromeOS, Android and Linux – for less than $100 these days. There are networks running on $45 Raspberry Pi single board computers.

The ease of installation argument is true in terms of less cabling and smaller overall footprint, but there is still labor cost in getting screens installed on most professional signage jobs. The crew is still getting paid to be there, even if it takes 15 minutes less.

Based on dozens of conversations, emails and online forms completed by industry contacts, it’s clear there is much more comfort and trust now, in the software community, that SoC is real and will stick around.

I was told repeatedly the display companies understand now they can't just push product on companies and expect them to use it, and that they can't develop in a bubble or make changes without first collaborating with their partners. That was not the case early on.

One CTO said privately he could not trust the display manufacturer and his team was regularly having to adapt and pivot when new firmware versions were released that "broke" some of their software.

Another CEO said working with one of the Korean manufacturers on its SoC platform – because it was mandated by a client – was a "nightmare" because of the slow response of engineers, time zone differences and unilateral decisions decisions made in Korea that effectively broke functionality.

I was told privately by software companies that they remain wary of manufacturers who are in the business to move panels by the thousands, and will not be sensitive to the development needs and resources of far smaller companies. If the largest companies, like Samsung, want or need to change something, they'll just do it, these companies worry.

Trust in the display manufacturers, among software companies, is almost always shaded by how many of them have and actively market free or low-cost content management platforms that are directly competitive to these partners.

Worries remain about how the added cost of the SoC hardware in the displays has added to overall cost, when volume buying decisions hinge heavily on price.

It's also clear the platforms, in general, have grown up and are far more stable and robust. One software company told me their R&D team benchmarked a new SoC panel against their "go-to" PC they use for deployments, and the SoC was clearly superior in shootout performance testing.

There is also Chris Riegel's logical concern about signing on to a proprietary display platform and surrendering the ability to make the best deal among multiple vendors. On the other hand, an end-user surrenders its software options the moment it signs with a CMS company and is effectively stuck in that universe for a subscription term.

Summing up this report's findings in simple terms:

- All the big guys are doing SoC;
- The technology has come a long way, and smart displays are now as good as, or better, than some PCs;
- Development is far easier, but each option requires time and cost;
- New development releases are increasingly reflecting reseller and user needs, and not the ideas of the display manufacturers' engineering teams;
- Hundreds of thousands of SoCs are out there, but it's not clear how many are using the built-in smarts – likely less than half and in some cases as little as 10%;
- Most of the deployed networks using SoC are relatively small, but end-users are now talking seriously about very large networks that would be all-SoC;
- New end-users are emerging that are using smart signs for uses like streaming or workplace dashboards;
- But confidence is up on a maturing tech, and more jobs are designed with SoC in mind.

Thanks for reading all this (if you got this far). I hope you learned a few things. I did.

Dave Haynes, March 2017

SIXTEEN:NINE

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