Smartphone-based Connectivity on AGL
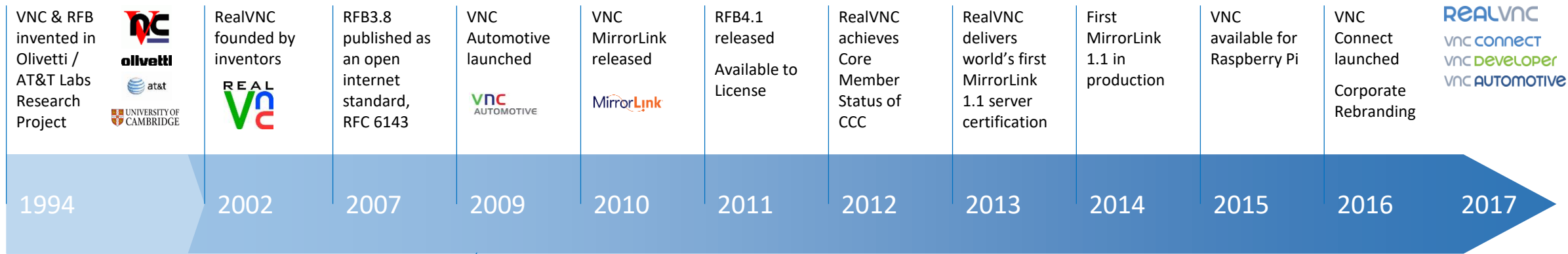
Agustin Almansi
Technology Consultant
01 June 2017

Agenda

- About RealVNC & VNC Automotive
- Why connect the smartphone to the car?
- Smartphone-based connectivity review
- Connected Car with MirrorLink
- Integration on AGL

About RealVNC & VNC Automotive

VNC Automotive is a pioneer in delivering connected car solutions…

1994	2002	2007	2009	2010	2011	2012	2013	2014	2015	2016	2017
VNC & RFB invented in Olivetti / AT&T Labs Research Project	RealVNC founded by inventors	RFB3.8 published as an open internet standard, RFC 6143	VNC Automotive launched	VNC MirrorLink released	RFB4.1 released Available to License	RealVNC achieves Core Member Status of CCC	RealVNC delivers world's first MirrorLink 1.1 server certification	First MirrorLink 1.1 in production	VNC available for Raspberry Pi	VNC Connect launched Corporate Rebranding	

VNC Automotive, 2017

15 Auto OEMs
50+ Vehicle Models
10+ Million Cars
100+ Million Phones

First Automotive partners signed — CYBERCOM GROUP, WIPRO Applying Thought

First contract with major Tier 1 — DENSO

Contract with clarion

First contract with Panasonic

VNC release support for iPod Out — Apple

First contract direct with Auto OEM — HONDA

First MirrorLink in cars (customer option) — TOYOTA

membership — CARCONNECTIVITY consortium

Major head unit contract for VW Group — TechniSat

Major contract for head units — MITSUBISHI ELECTRIC

Telematics solution — RAND McNALLY

Sony phone contract — SONY make.believe

Major Chinese OEM — HUAWEI

membership — GENIVI

Handsets OEM — FUJITSU

First MirrorLink 1.1 in production — HTC

First volume line-fit MirrorLink — HONDA

Telematics solution — Ag Leader Technology

VNC Automotive supports — Works with Apple CarPlay, android auto, Baidu CarLife

Partnerships — Baidu 百度

Partnerships — MEDIATEK

Volume line-fit production — VW, PSA PEUGEOT CITROËN, ŠKODA, SUZUKI, SEAT

Member — THE LINUX FOUNDATION, AUTOMOTIVE GRADE LINUX

Collaborating with Volkswagen to deliver a market-defining user experience to MirrorLink connected cars

RealVNC work very closely with Volkswagen and all major mobile phone OEMs providing a mature, high-performance MirrorLink implementation. This close cooperation has brought many new major mobile phone vendors to the ecosystem. Using our VNC Automotive™ MirrorLink Certified™ solution in their handsets provides fast time-to-market and guaranteed MirrorLink Certification.

As part of our continuous improvement process, we are pleased to declare our commitment to Volkswagen to refine and perfect the overall end-to-end user experience for MirrorLink enabled devices.

Using our unique position in the industry as a vendor of full MirrorLink software stack technology, for both ends of the connection (in the car and mobile devices), RealVNC are able to realise a highly optimised MirrorLink solution where both ends are designed and guaranteed to work well together. Thus ensuring fast response times and a smooth driver experience. As the industry strives to ensure a high level of interoperability and consistent user experience, knowing the mobile devices have the same underlying software stack is a significant assurance to Volkswagen.

Why connecting the smartphone to the car makes sense

Advantages of having Smartphone connectivity

For driver

Familiar / Consistent user-experience

Continue using favourite Apps

Large app ecosystem
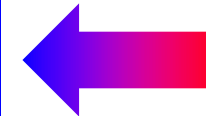
No need to sync content

For IVI Developer (Car OEM, Tier 1/2)

Simplify development

Easy to extend and update

Increased security, sandboxing

Reduced hardware / software cost
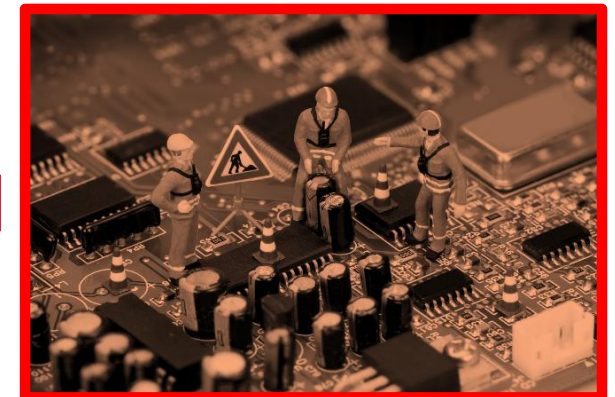
Smartphone-based connectivity review

Smartphone-based connectivity solutions are emerging

Mobile Centric

- Mobile ecosystem
- Mobile brand

Open Standard

- Community driven
- Brand neutral

OEM Centric

- Preserve the traditional OEM ecosystem
- OEM brand

Multiple connectivity standards but no clear winner

It is very likely that the trend to support multiple standards in one HU will grow.

Mobile Centric			Open Standard		OEM Centric	
Works with Apple CarPlay	**android auto**	**Baidu CarLife**	**MirrorLink**	**sdl**	**VNC**	**mySPIN**
– Closed standard – Limited Apps controlled by Apple – Siri voice mandated – OEM liability concerns* – Pre-installed on iOS devices	– Closed standard – Not available globally (e.g. China) – OEM liability concerns* – Most modern Android devices supported	– Closed standard – Limited to Baidu Services – OEM liability concerns* – Works well in China – Supports iOS and Android	– Open standard – Driven by Auto OEMs & Handset Vendors – Open to any App developer – Auto OEMs in full control	– Open standard – Open to any App developer – Capabilities limited by templates – Auto OEMs in full control	– Open or closed standard – Extendable providing greater flexibility – Supports rear- seats, multiple handsets etc. – Car OEM need to create Mobile App	– Closed standard – Auto OEM in full control – Supports iOS and Android

* Auto OEMs have expressed serious liability concerns as both Apple and Google accept no liability, e.g. Driver distraction, yet provide no way for the OEMs to influence what is displayed

Apple CarPlay

- Apple-centric Ecosystem, iPhone 5+
- Proprietary Protocol
- 3rd party Apps as services (media, text)
- OEM Apps supported
- Driver Distraction Policy: Templates
- Siri for voice control
- Projected Virtual Display

Application Library

- Media and Messaging Only
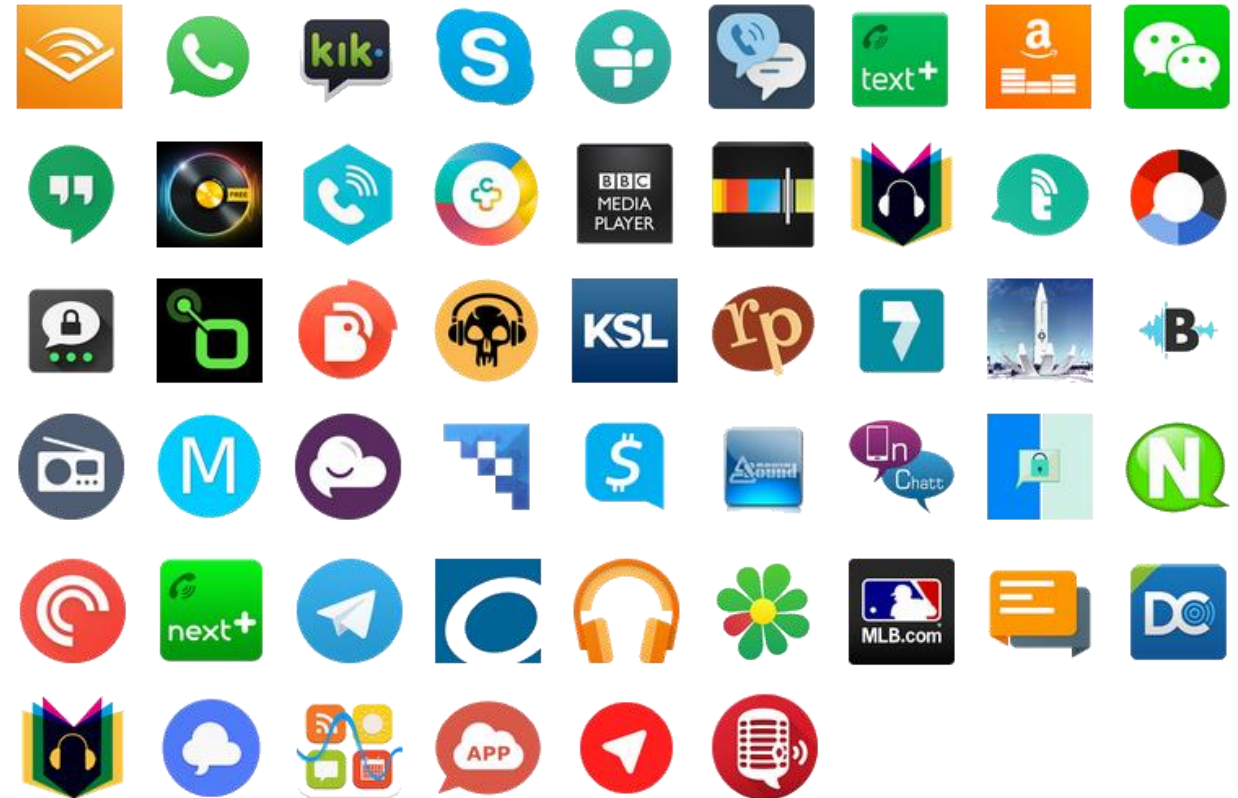- No Maps, No Parking

Works with Apple CarPlay

Google Android Auto

- Google-centric Ecosystem, Lollipop+
- Proprietary Protocol
- 3rd party Apps as services (media, text)
- OEM Apps supported
- Driver Distraction Policy: Templates
- Google Now
- Projected Virtual Display

Application Library

android auto

- Media and Messaging Only
- No Maps, No Parking

Baidu CarLife

Application Library

- Baidu-centric Ecosystem
- Proprietary Protocol
- 3rd party Apps as services, China focus.
- Baidu Services in the Car
- Projected Baidu Application Display
- Supports both iOS and Android devices

SmartDeviceLink

- OEM-centric Ecosystem
- Open Protocol
- Open-source Application Developer SDK
- Driver Distraction Policy: Whitelist
- Template based remote rendering

Application Library

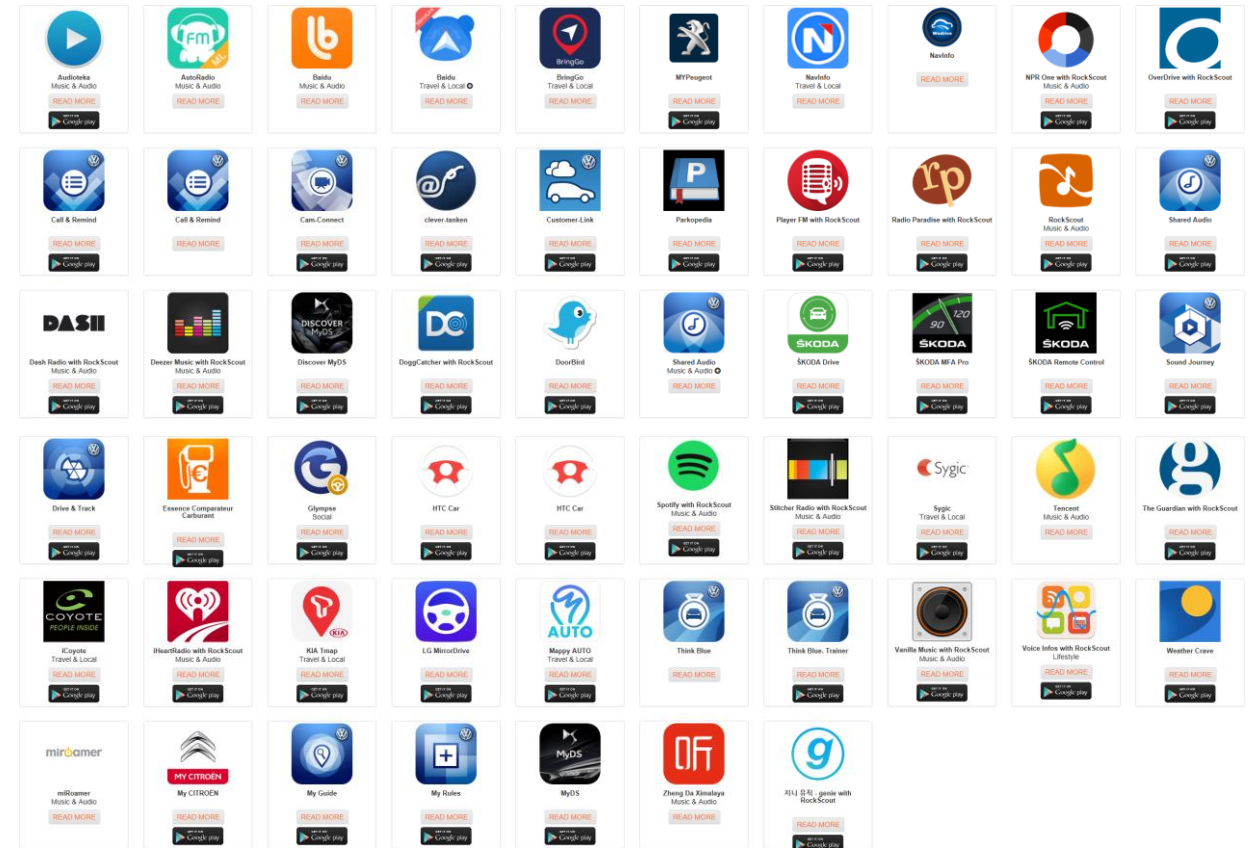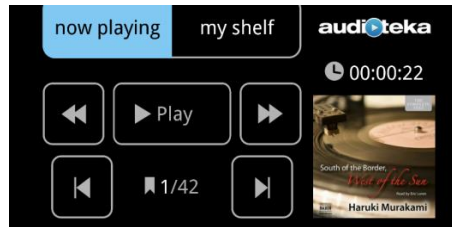# Connected Car with

MirrorLink

- Open Ecosystem, controlled by consortium of car OEMs and smartphone OEMS

- Open Protocol

- Driver Distraction Policy: Certification program

- Projected Application Display

Car Connectivity Consortium

- Global consortium to develop connected-car solutions, including smartphone based connectivity
  - Membership open to any interested company
  - Solutions are not owned or governed by a single corporation
  - OS agnostic - No platform limitations
  - Assure device and application interoperability
  - Future proof – not reliant on a single vendor
- Bringing car, mobile and head-unit industries together
  - Established in February, 2011. Now 100 member companies
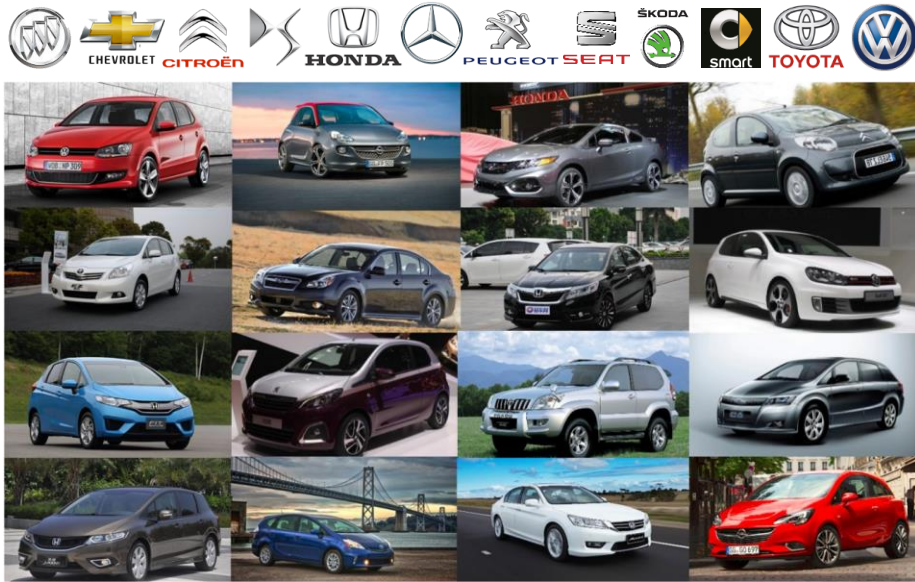 - Automotive, Smartphone, Tier 1 and Ecosystem-enablers

Some of CCC Members are:

MirrorLink is the only cross-industry collaboration
in developing an open standard for car-smartphone connectivity
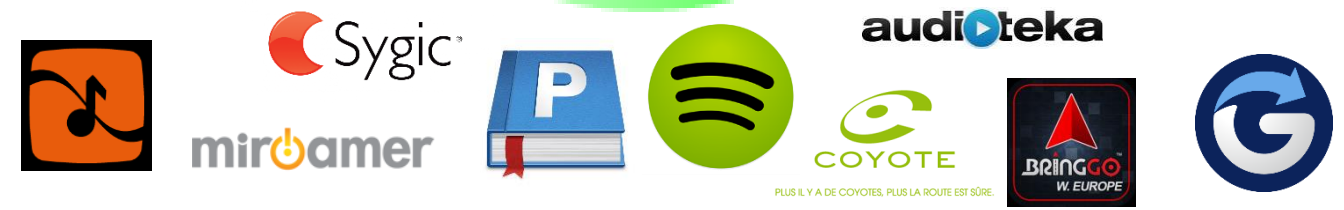
Extensive support in cars, smartphones and Apps
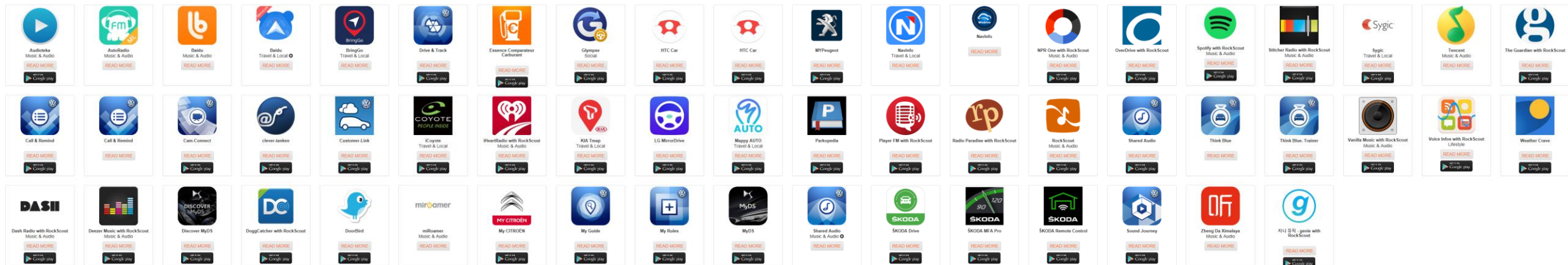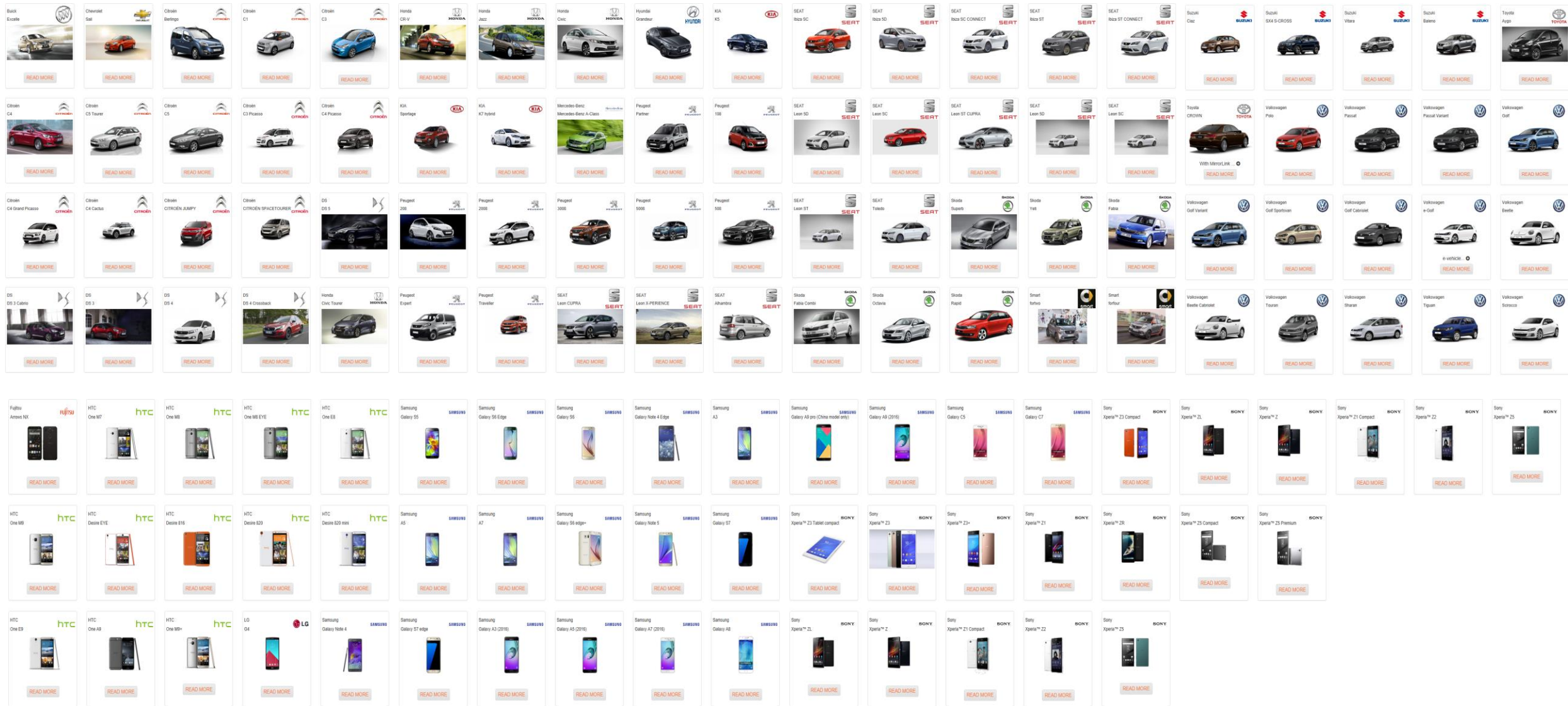
30+ Million cars MirrorLink enabled, 250+ Million phones

History of MirrorLink

- v1.0
  - Initial release
  - a.k.a. Terminal Mode
- v1.1
  - In production since 2014
  - Provided foundation for 3rd party Apps
- v1.2
  - expanded technology portfolio with wireless MirrorLink (WFD)
  - In production since 2016

- v1.3
  - being published to members
  - Adds H.264 encoding for the RFB protocol, supporting HD resolutions
  - More features for App developers

  - **Will be published as an ETSI (European Telecommunications Standards Institute) standard**

Wireless MirrorLink is already available

Volkswagen + Samsung Showcase at CES 2016

Skoda + Samsung PR in 2016

MIRRORLINK USER EXPERIENCE
Leveraging vehicle's accessible Display and Controls

No obstruction from dash or window mounted device

Stored

Car optimized Audio Input & Output

Car optimized Display & Input Control

No holding
No touching
No looking
No glancing

VNC AUTOMOTIVE
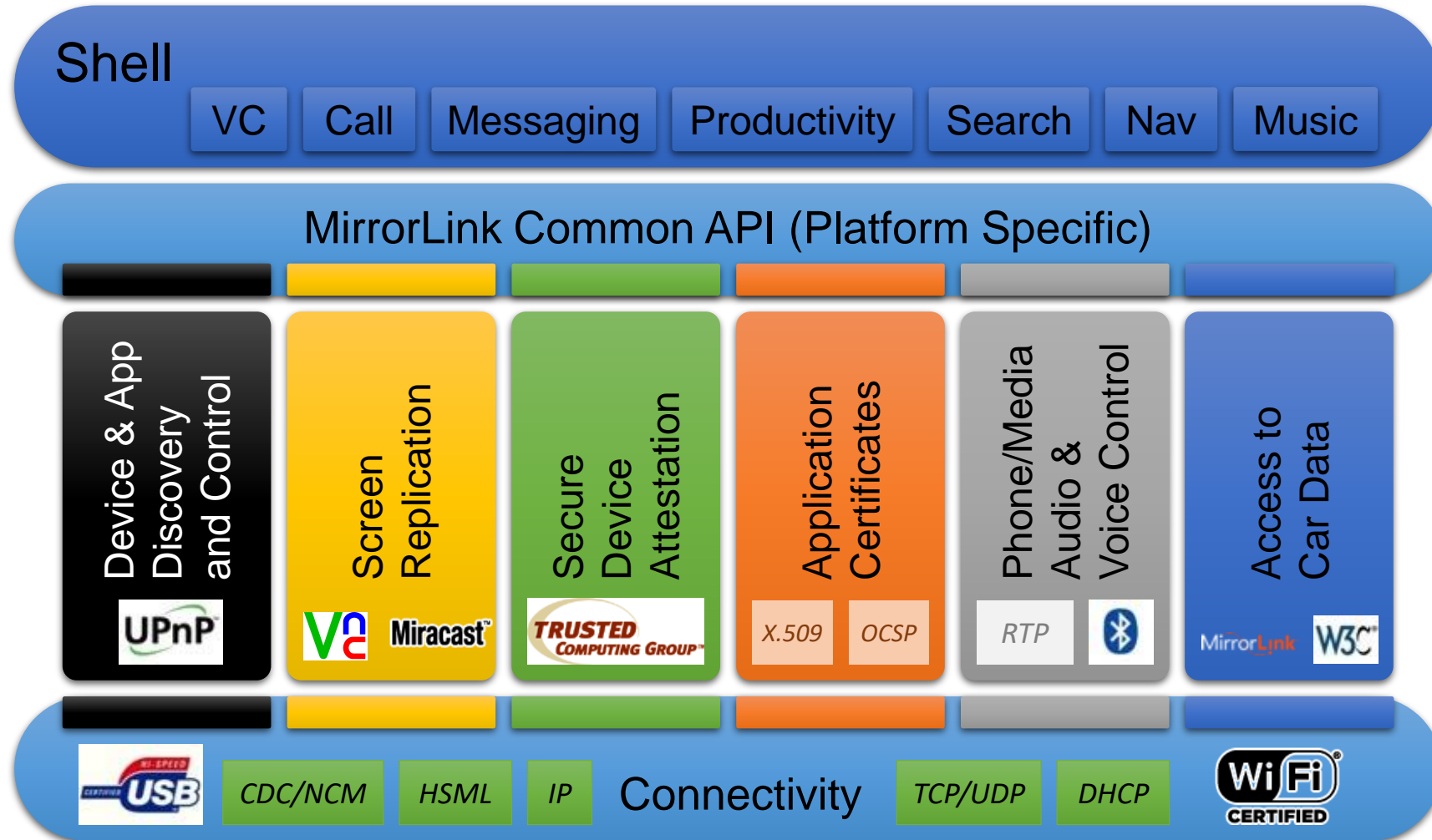
Certification program

- Certification program built to help offset risk

- Device certification

  - Conformance with specification

  - Interoperability with reference devices

- Application certification

  - Driver Distraction testing

  - Region-based following local regulations

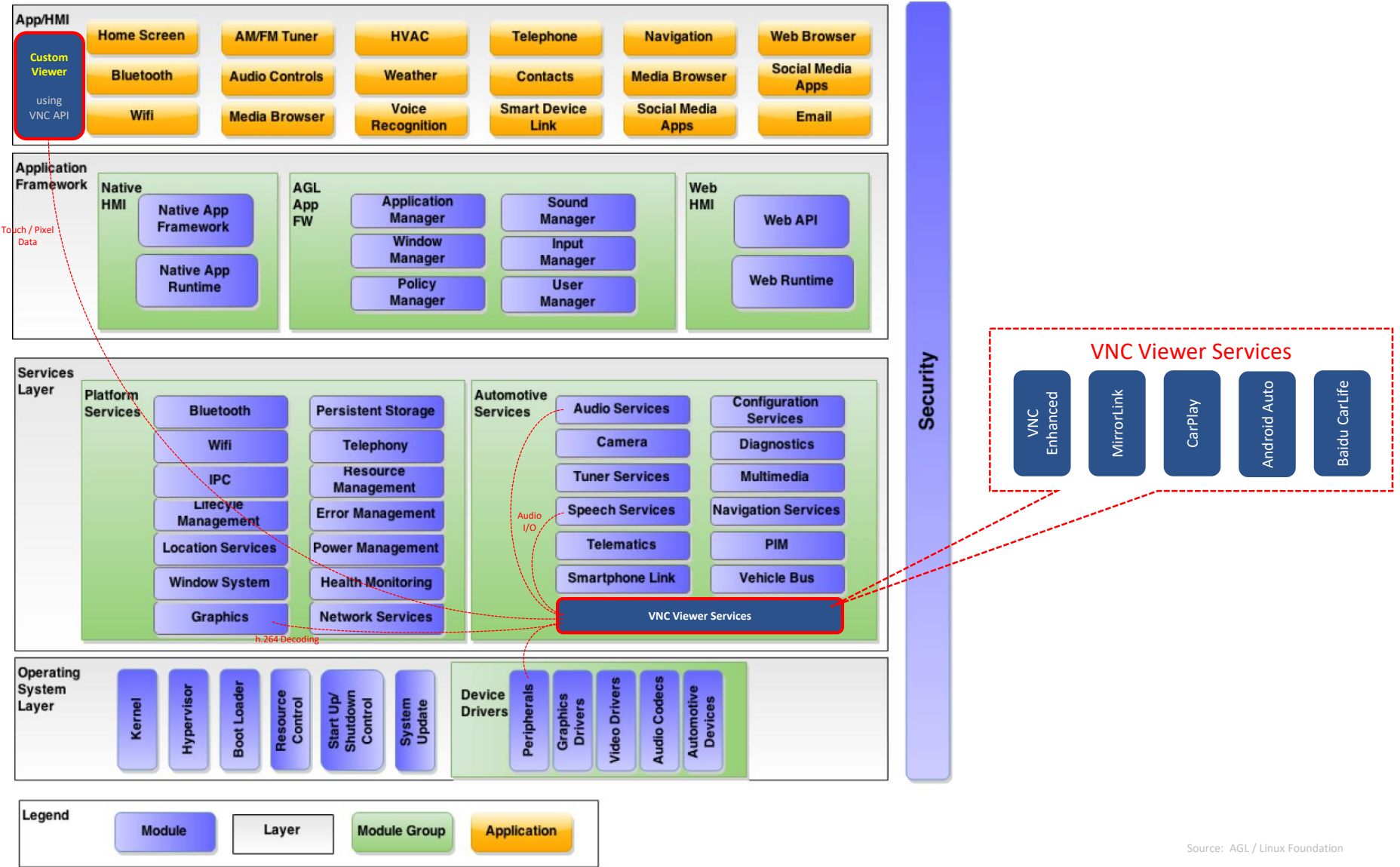- Conducted by approved Test Labs

MirrorLink Architecture

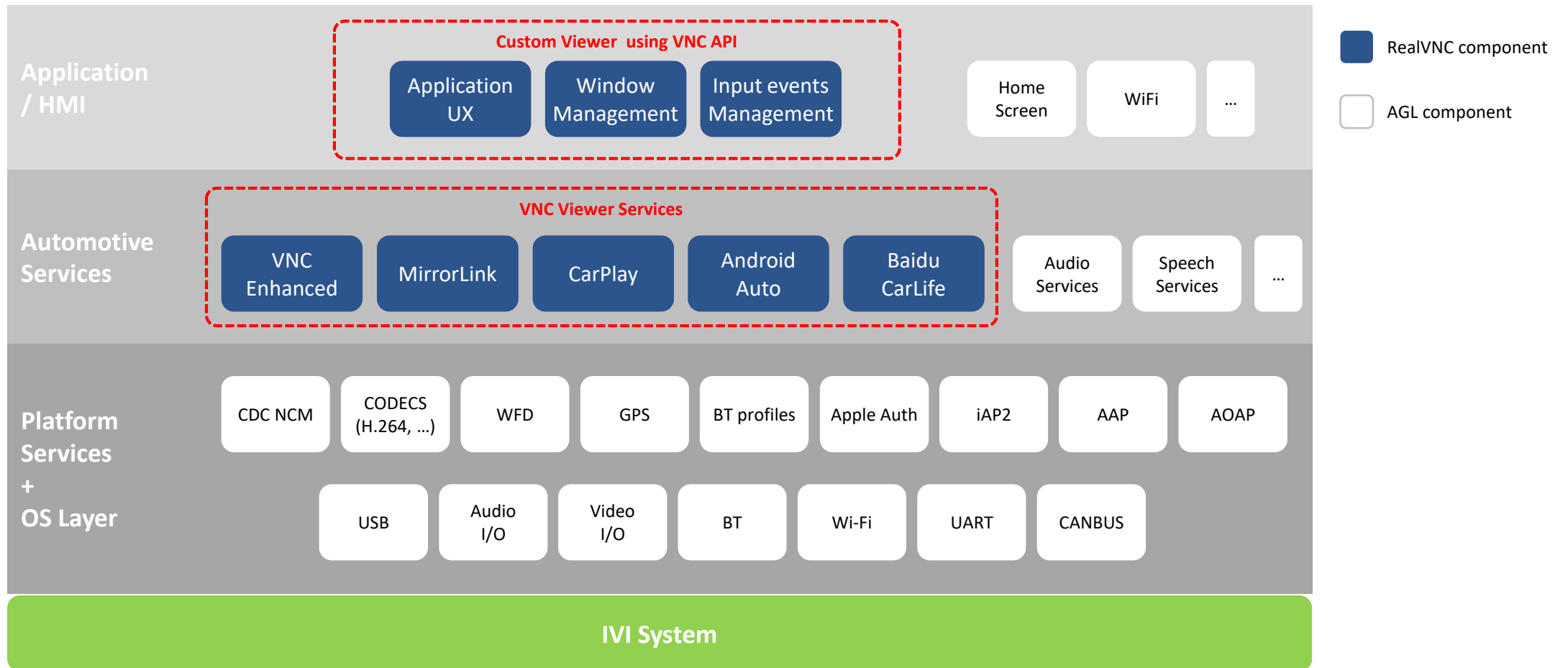MirrorLink™ uses VNC (RFB 3.8) for remote control

Shell

| VC | Call | Messaging | Productivity | Search | Nav | Music |

MirrorLink Common API (Platform Specific)

Device & App Discovery and Control — **UPnP**

Screen Replication — **VNC** **Miracast™**

Secure Device Attestation — **TRUSTED COMPUTING GROUP™**

Application Certificates — *X.509* *OCSP*

Phone/Media Audio & Voice Control — *RTP* Bluetooth

Access to Car Data — **MirrorLink** **W3C**

Connectivity — HI-SPEED USB | CDC/NCM | HSML | IP | TCP/UDP | DHCP | WiFi CERTIFIED

Integration on AGL

AGL Architecture:

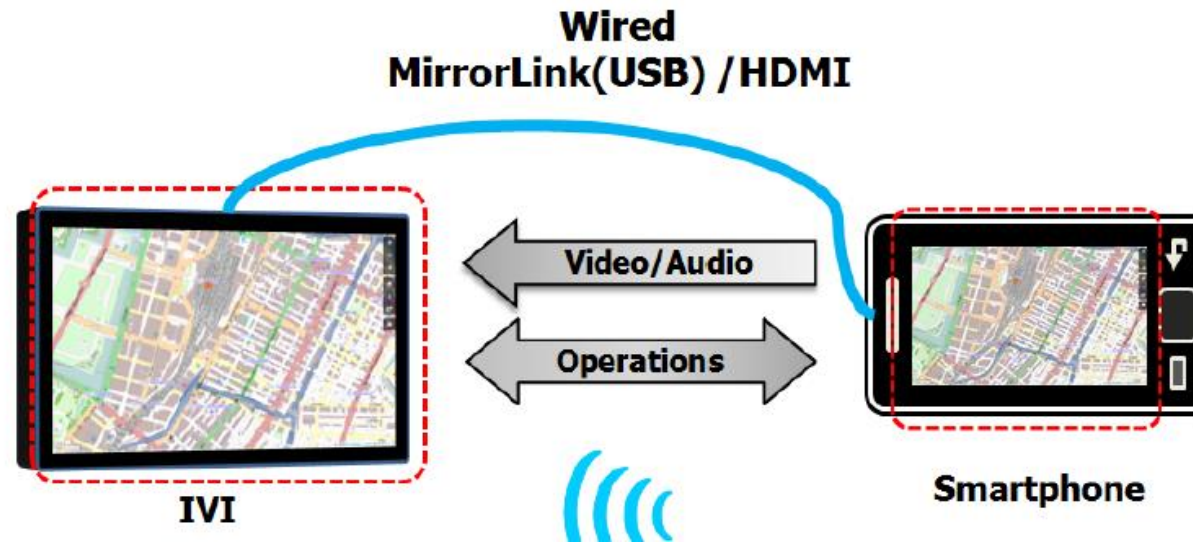Source: AGL / Linux Foundation

AGL 'Smartphone Link' Service

5.2.8 Smartphone Link

This section describes regarding Smartphone link. Smartphone Link is the technology which realizes that video and audio streaming play which data from smartphone. And touch operation is possible to share between IVI and smartphone. MirrorLink, Miracast, SmartDeviceLink and AirPlay are technologies that realize Smartphone Link. By this technology, it is possible to use smartphone content (map, music, browser...) by IVI.

Figure 8-30 shows the system structure of the Smartphone Link.

Wired
MirrorLink(USB) /HDMI

Video/Audio

Operations

IVI

Smartphone

Thank you

VNC AUTOMOTIVE

Please visit our website for more information

https://automotive.realvnc.com/

https://www.realvnc.com/