Can C-ITS Benefit from MirrorLink?

Dr. Jörg Brakensiek
Chief Architect and Chair of Technical WG
Global consortium to develop smartphone-based connected-car solutions

- Membership open to any interested company
- Solutions are not owned or governed by a single corporation
- Our solutions are OS agnostic - No platform limitations
- Assure device and application interoperability

Bringing car, handset and head-unit industries together

- Established in February, 2011
- Automotive, Smartphone, Tier 1 and Eco-system enablers

MirrorLink® is The open industry standard for Smartphone-Car integration
Some of Our Members

- Toyota
- Alpine
- Kia
- Kia Motors
- Clarion
- HTC
- Fiat
- Real VNC
- Volkswagen
- Mercedes-Benz
- JVC Kenwood
- Qualcomm
- Honda
- PSA Peugeot Citroën
- Mitsubishi Electric
- Panasonic
- Samsung
- GM
- Huawei
- Microsoft
- Hyundai
- LG Electronics
- QNX Software Systems
- Denso
- Harman
- Mazda
- MirrorLink
Target User Experience
Delivered via MirrorLink®

Car optimized Audio Input & Output
Car optimized Display & Input Control

No obstruction from dash or window mounted device

No holding
No touching
No looking
No glancing
MirrorLink® Overview
Physical Connectivity

- **Warcom**:
  - DHCP
  - UDP
  - TCP
  - ARP
  - IPv4
  - Ethernet
  - USB CDC/NCM
  - Wi-Fi P2P

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1. Device advertises MirrorLink capability
2. Device identify each other
3. Phone contains a set of (certified) MirrorLink apps
4. Head-Unit requests application list and displays it to user
5. Consumer selects app
6. Head-Unit sends app launch request to phone
7. Phone brings app to foreground
Remote UI
- Raw, Run Length, H.264

Touch Events
- Single/Multi-touch event

Key Events
- X11 events,
- Rotary Knob, Multimedia, ...

Legacy Bluetooth
- BT HFP & BT A2DP

RTP Audio Streaming (bi-directional)
- 48 kHz, 16 bit, Stereo
- RTP header extension
Common Data Bus
- Data service level
- Service advertisement
- Start/Stop service
- Data Payload, Response

Service Binary Protocol
- Data objects level
- Object values
- Object type (Int, Dbl, struct, [ ], …)
- Object access (Get, Set, Subscribe)

Data Service 1
Data Service 2
Data Service Endpoint
A
B
C
D

Access to Car Data
MirrorLink® Overview
Application Certification

1. User installs App from any App Store
2. Phone downloads matching App Cert from CCC DB
3. Phone validates Certificate
4. Phone regularly checks App Cert Status with CCC DB (Revocation)

App Store
CCC Cert Database
Self
ID
App
MirrorLink Phone
CCC
App Advertisements
MirrorLink Head-Unit

X.509
OCSP

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Simple Guideline Objectives

- Ensure that apps **work** within different cars
- Ensure that apps do **not distract** the driver from his/her main task – driving.

Guidelines do NOT include

- Business logic
- Hidden rules
Freedom of Design
To Design the most Innovative Application

Design Principles
• App developers get an empty canvas
• Allows to transport app’s brand identity.
• Templates are possible

No Limitations
• Apps can be of any kind; navigation, entertainment, social, messaging, …
MirrorLink® Products
Can Cooperative-ITS (C-ITS) benefit from MirrorLink?

- In Cooperative ITS, vehicles communicate with each other and/or with roadside infrastructure, greatly increasing the quality and reliability of information available about the vehicles, their location and the road environment.
- In MirrorLink, Smartphones project the User Interface of consumer applications onto the vehicle dashboards.
- Safety is a critical objectives for both, C-ITS and MirrorLink.
- MirrorLink is tailored towards individual consumers – driving an individual vehicle.
- C-ITS is tailored towards infrastructure, and the interaction of individual vehicles within it.
Can Cooperative-ITS (C-ITS) benefit from MirrorLink?

- MirrorLink does not rely on any new infrastructure deployments. Connectivity needs are provided from the Smartphone, via existing cellular connectivity.
- MirrorLink can offer C-ITS an established platform to deploy ITS focused applications to consumers and bring those to the eye of individual consumers, while being on the road, safely.
- MirrorLink can augment ITS data with consumer data, via MirrorLink’s data service architecture.
- MirrorLink can provide an additional path to collect ITS relevant data from vehicles, not being C-ITS ready.
- MirrorLink and C-ITS are not mutually exclusive, but really offer complementary capabilities to benefit both – the consumer and society.
- So, can MirrorLink benefit from C-ITS? Yes!
Thank you! – Questions?

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