

# Developing Automotive Linux

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February 4, 2015



Hyperlinks in blue.

Who's using Linux in cars?



# The GENIVI Alliance Membership ([www.genivi.org](http://www.genivi.org))



## OEMs



## First Tiers



## OSV, Middleware, Hardware, and Services Suppliers



## Silicon



# Automotive Grade Linux participants

Advanced  
Telematic  
SYSTEMS

AJ  
AISIN AW CO.,LTD.

(AllGo)  
embedded

BearingPoint.

cinemo  
changing the embedded  
entertainment world

COMPONENTIALITY  
New reality.  
New mobility.

DENSO

ETRI  
Electronics and Telecommunications  
Research Institute

FEUERLABS

FUJITSU

FUJITSU TEN

GlobalLogic

HARMAN

HITACHI  
Inspire the Next

hostconcepts

HYUNDAI

MITSUBISHI  
ELECTRIC  
Changes for the Better

NEC

NISSAN

NTT DATA  
NTT DATA MSE Corporation

igalia

intel

JAGUAR  
LAND-ROVER

JVC KENWOOD  
creates excitement & peace of mind

NVIDIA.

OSYSYSTEMS

03IGO

OPENSYNERGY

LG

Linaro

micware

Do the Next. Open your Windows  
MIRACLE

Panasonic

Reaktor

RENESAS

ROSA

SAMSUNG

Suntec

<sybio>

ST symphony  
teleca

systema

TEXAS  
INSTRUMENTS

helo

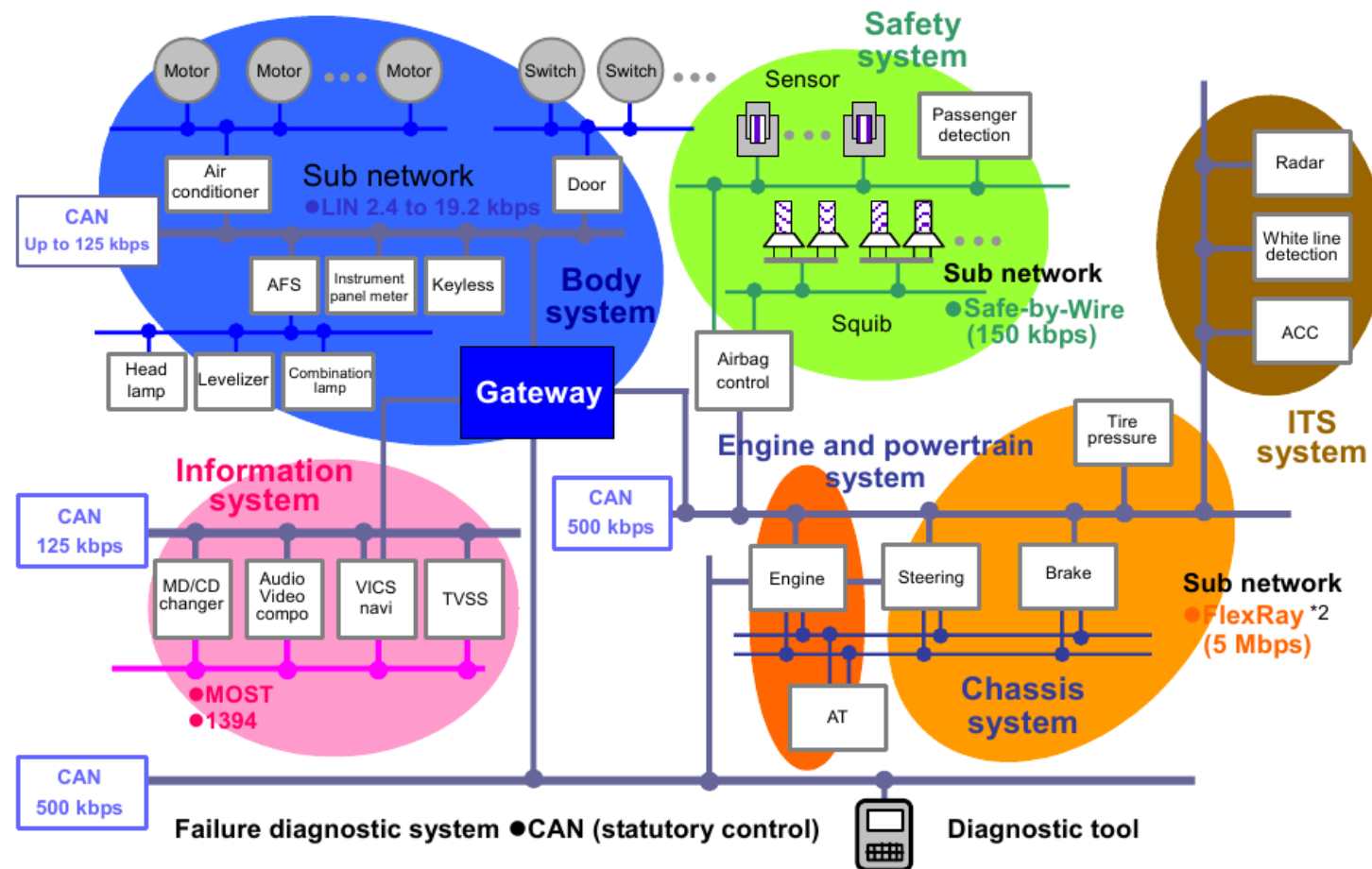
TOYOTA

## Current **Public** Status of Automotive Linux

<u>OEM</u>	<u>Confirmed Operating system</u>
Fiat-Chrysler Blue&Me (500, Delta), Kia Uvo	Microsoft Windows Embedded Automotive
Ford (pre-2016)	MyTouch/Sync-Microsoft; OpenXC-Android
General Motors, Tesla, Volvo, Geely, BMW (2016+), Infiniti (Q50)	GENIVI Linux
Renault R-Link	<i>native</i> Android Linux
Jaguar Land-Rover, Toyota	Tizen/Automotive Grade Linux
Honda (older Accord, Odyssey, Pilot), Audi (A8L, Q5, A6), BMW (older 7-series and M models), Chrysler, Daewoo, GM (OnStar), Hyundai, Porsche, Renault (SM7), Mercedes (S- and C-class), Ford (2016+)	QNX

Oversimplified: each vehicle runs more than one OS.

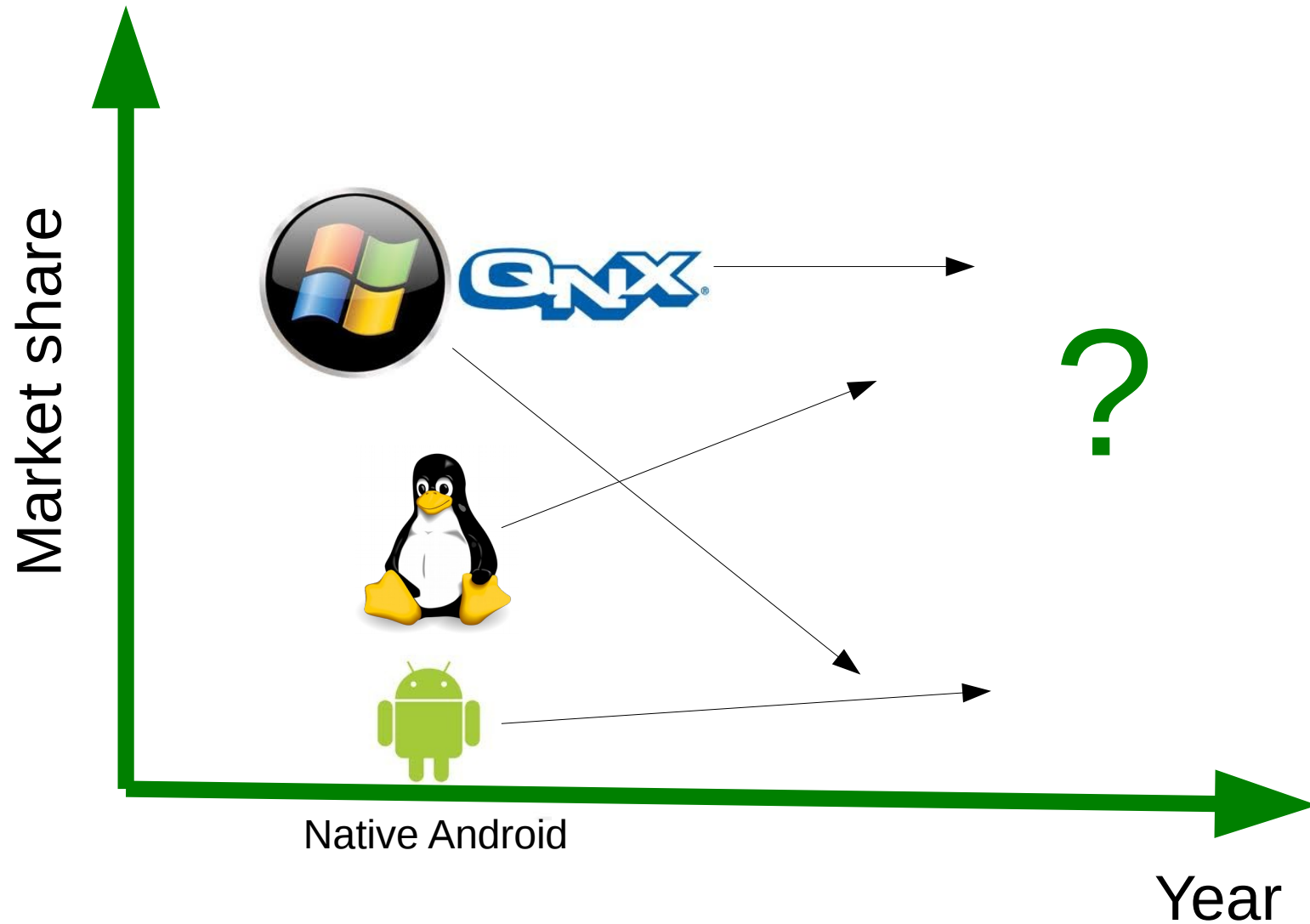
# Automotive computing mixes mission-critical and “infotainment”



Copyright Renesas, “Introduction to CAN”, with permission.

Microcontrollers typically run AUTOSAR rather than general-purpose OS.

# Automotive OS Outlook



How is Android deployed on automotive platforms?



# The GENIVI Alliance Will Offer an Android Auto™ Interface

January 12, 2015 by [John Day](#)



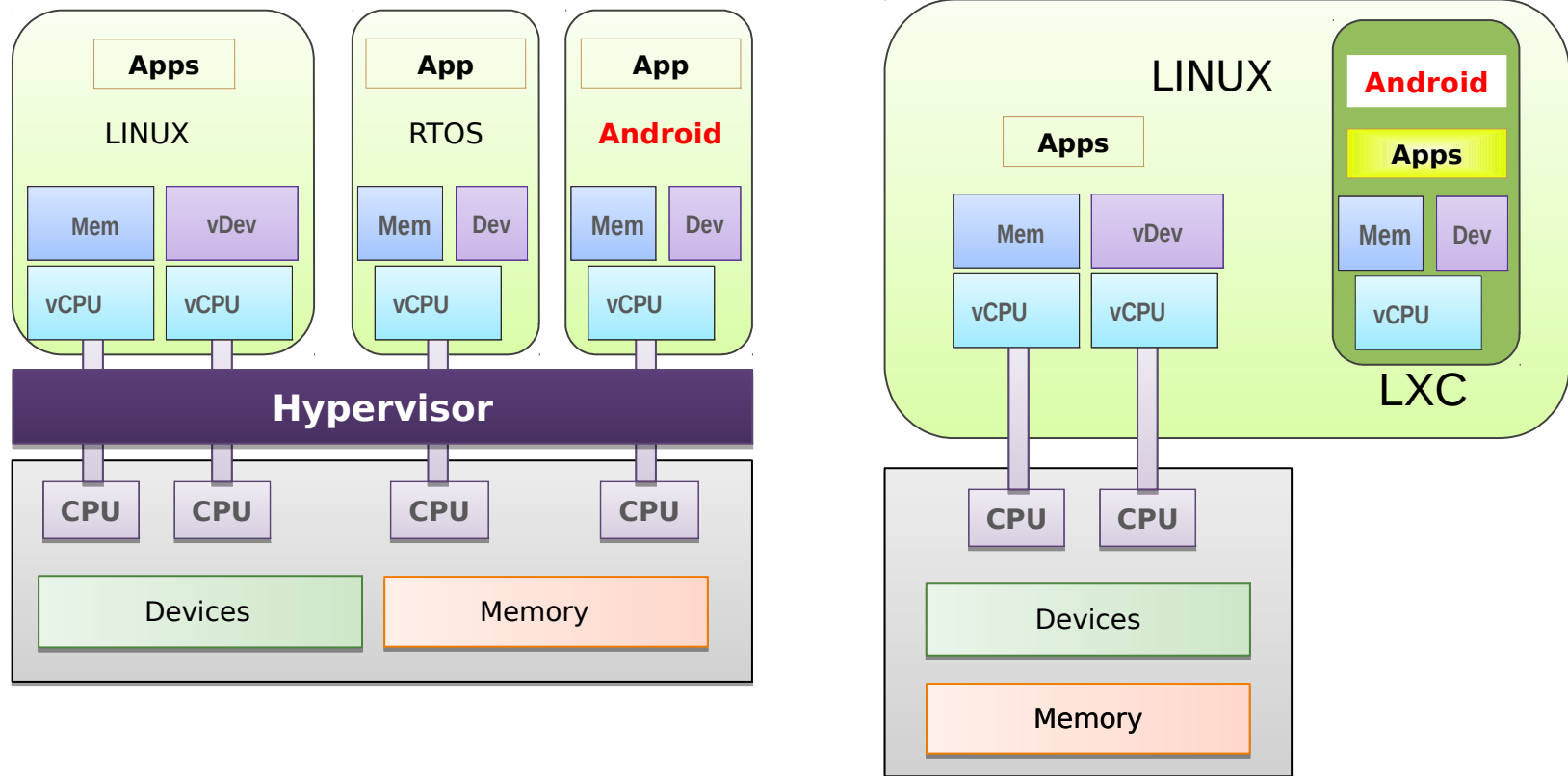
**GENIVI**

## **Automotive Software Developers Will Have an Open Interface to Google's Latest Android Auto Technology.**

The GENIVI® Alliance plans to deliver an open interface to Android Auto to further enable automakers with open solutions for their infotainment products.

GENIVI will fund the development and will release the code for the interface with an open source license, hosted at <http://projects.genivi.org>. Deployment of Android Auto will require a licensing arrangement with Google.

# Common automotive Android deployments



Based on a slide by [Felix Baum](#), Mentor Graphics.

# Linux containers and hypervisors

- LXC is
  - similar to BSD jails and Solaris zones.
  - the basis for widely popular Docker.
- LXC requires guests to share a Linux kernel but not platform SW.
- Hypervisor guests can run different kernels .
- Hypervisor securely manages interguest comms and device access.

Alternative developer-friendly ways to get started  
with automotive Android

## CES 2015: Parrot RNB6 aftermarket Android head unit

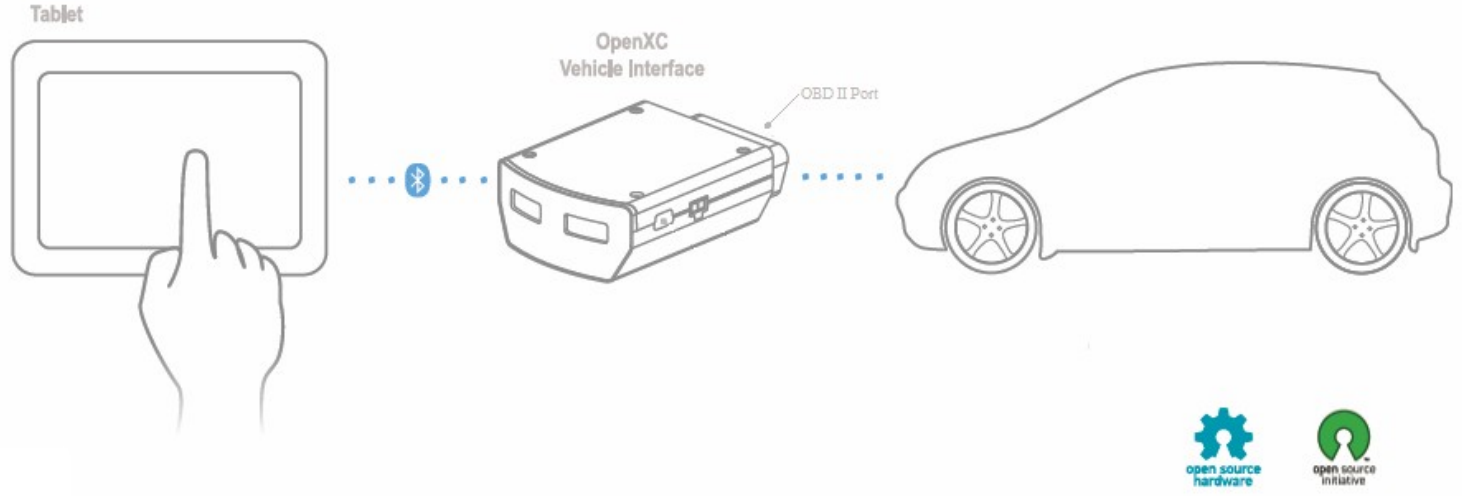


Parrot RNB6 (project code name) is an exceptional Android 2-DIN Infotainment Navigation System. Developed with safety in mind, this revolutionary head-unit leverages Parrot's extensive expertise in head-unit conception, voice recognition, Android operating system (Lollipop 5.0) and wireless technology to offer a smarter, safer and more innovative driving experience.

# OpenXC Platform

OpenXC

OpenXC is an open source hardware and software platform that lets you extend your vehicle with custom applications and pluggable modules.



Includes encrypted proprietary vehicle data from Ford and Chrysler.

# Resources

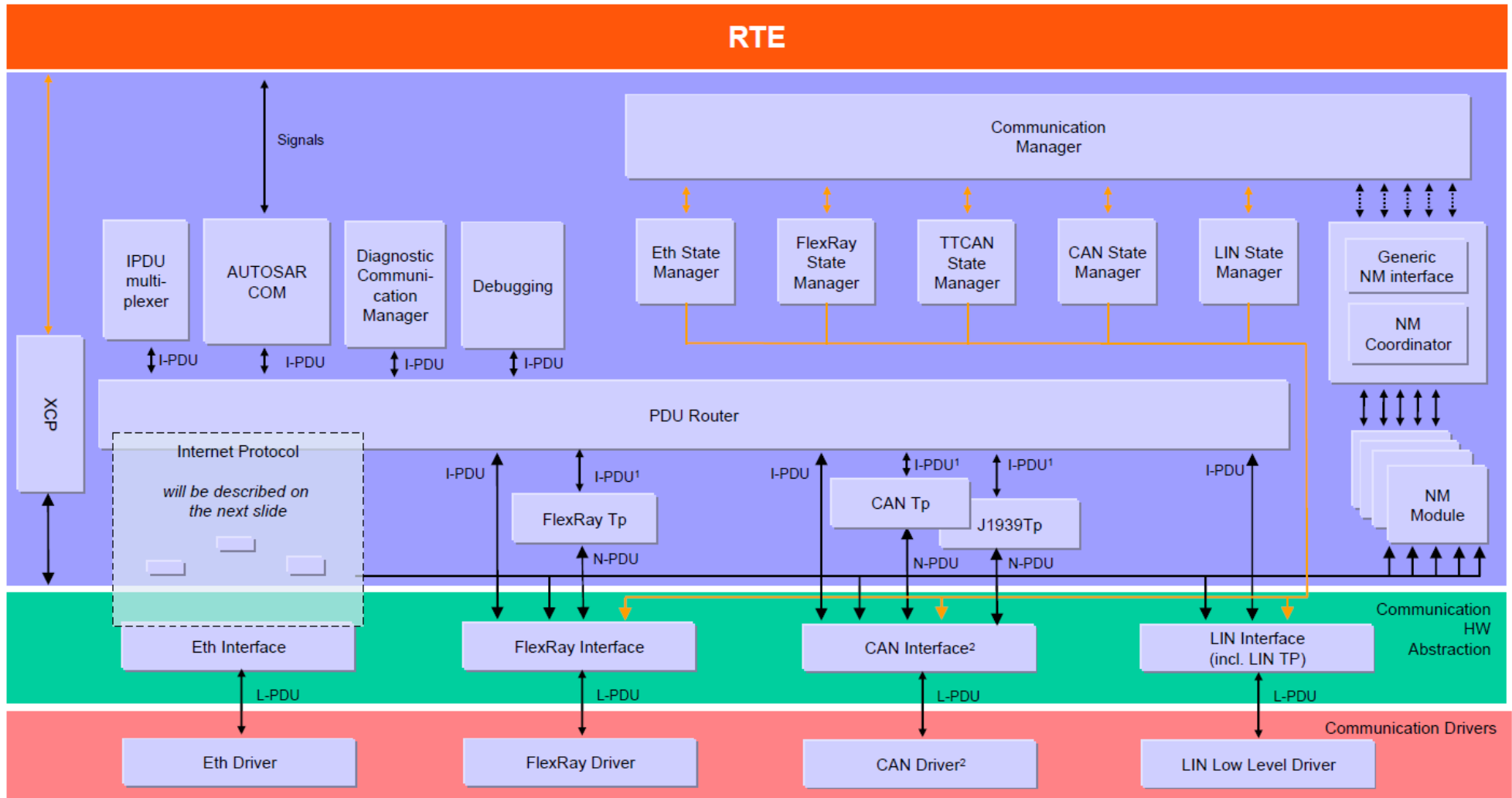
- [GENIVI](#) (mailing lists, package downloads)
- [Automotive Grade Linux](#)(mailing lists, images, downloads)
- [Baserock](#) (free installable images)
- [Android in LXC container how-to](#)
- [OpenXC platform](#) (github, hardware for purchase)
- [More automotive software slides](#)
- [Mentor Embedded automotive solutions](#)

# Summary

- Android Auto (and Apple CarPlay) are must-haves for automakers.
- Android deployment takes a variety of forms.
- Android will not boot “on the metal” in most vehicles.
- Android and Linux still struggle against incumbent QNX.



# Another view of automotive networks



courtesy AUTOSAR