

A red Lotus Evija electric sports car is shown from a front-three-quarter view. The car has a sleek, aerodynamic design with a low profile and large, black, multi-spoke wheels. The body is a vibrant red color. The background is a plain, light gray.



BU Operating Systems and Services

Instrument Cluster

In-vehicle Infotainment

ADAS

HW Adapter

HW Adapter

DVI

HDMI

Yocto Linux

DriveOS Communication Kernel Plugin

Quest RTOS

CAN Gateway

USB3-CAN Stack

Kvaser USBCan 5xHS

DX1100

Figure 1 illustrates the system architecture of the proposed secure SB. The diagram shows two SBs (Quest SB and Yocto Linux SB) connected via a central EPT (Extended Page Tables) component. The Quest SB architecture includes Real-time Tasks (libshmcomm) in Ring 3, shmcomm module in Ring 0 (Kernel), and shmcomm manager in Ring -1 (VMM). The Yocto Linux SB architecture includes User Interface and Apps (libshmcomm) in Ring 3, shmcomm module in Ring 0 (Kernel), and shmcomm manager in Ring -1 (VMM). Data flow is indicated by solid blue arrows, and control flow by dotted black arrows. A central Channel Pages block (Info Page) is locked and connected to the shmcomm manager of both SBs via the EPT component.

Figure 10 is a Cumulative Distribution Function (CDF) plot showing the end-to-end delay for three different configurations: DriveOS, Optimized Linux, and Linux. The x-axis represents the end-to-end delay in milliseconds (ms) on a logarithmic scale, ranging from 1.7 to 80.0. The y-axis represents the CDF, ranging from 0.0 to 1.0. The legend indicates that the blue dotted line represents DriveOS, the yellow dashed line represents Optimized Linux, and the red solid line represents Linux. A vertical red dashed line is drawn at 10 ms, and a vertical green solid line is drawn at approximately 12 ms. The plot shows that DriveOS has the lowest end-to-end delay, followed by Optimized Linux, and then Linux.

End-to-end Delay (ms)	DriveOS CDF	Optimized Linux CDF	Linux CDF
1.7	0.20	0.00	0.00
3.0	0.90	0.15	0.20
5.0	0.95	0.50	0.60
10.0	1.00	0.80	0.85
20.0	1.00	0.95	0.95
40.0	1.00	1.00	1.00
80.0	1.00	1.00	1.00

	Yocto Linux	Optimized Yocto Linux	DriveOS
IC and IVI	1378	1558	1938
OpenPilot ADAS	17.45	17.56	19.94

