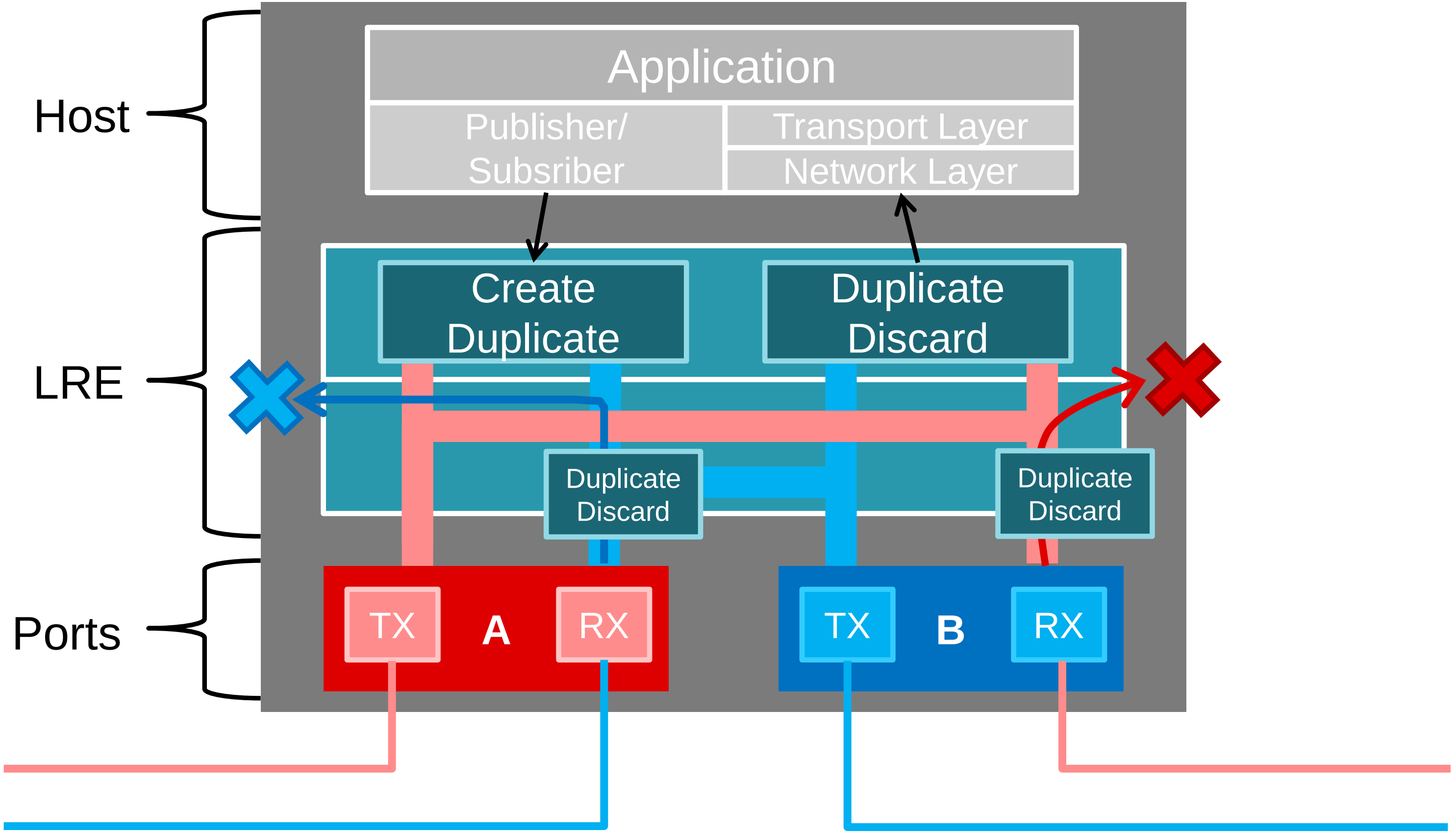
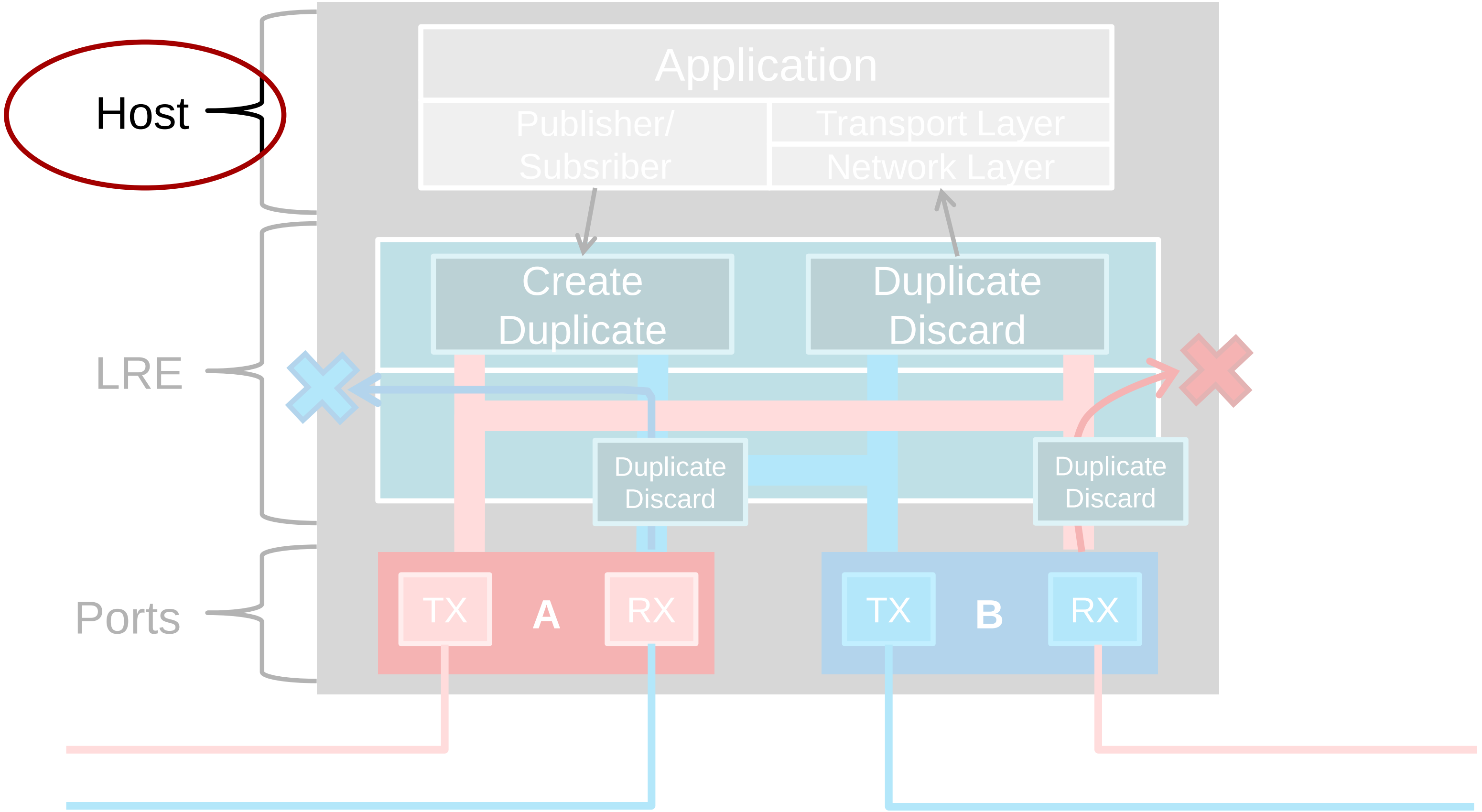
HSR and PRP Redundancy on RT Linux

Part 3: Redundancy and Linux

Which Operating System on the host for HSR/PRP?

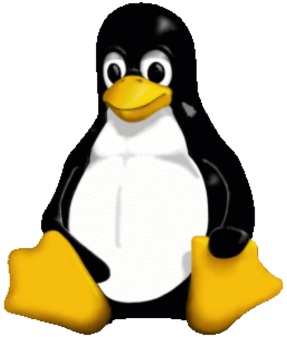


Which Operating System on the host for HSR/PRP?



Linux is recognized with networking

- Since these applications are networking based, Linux seems like a natural choice
  - Allows scale across products and platforms
  - Reuse common networking stack, applications, tools, scripts, etc.
- Some packet deadlines may require RT Linux
- TI-RTOS solutions are also available



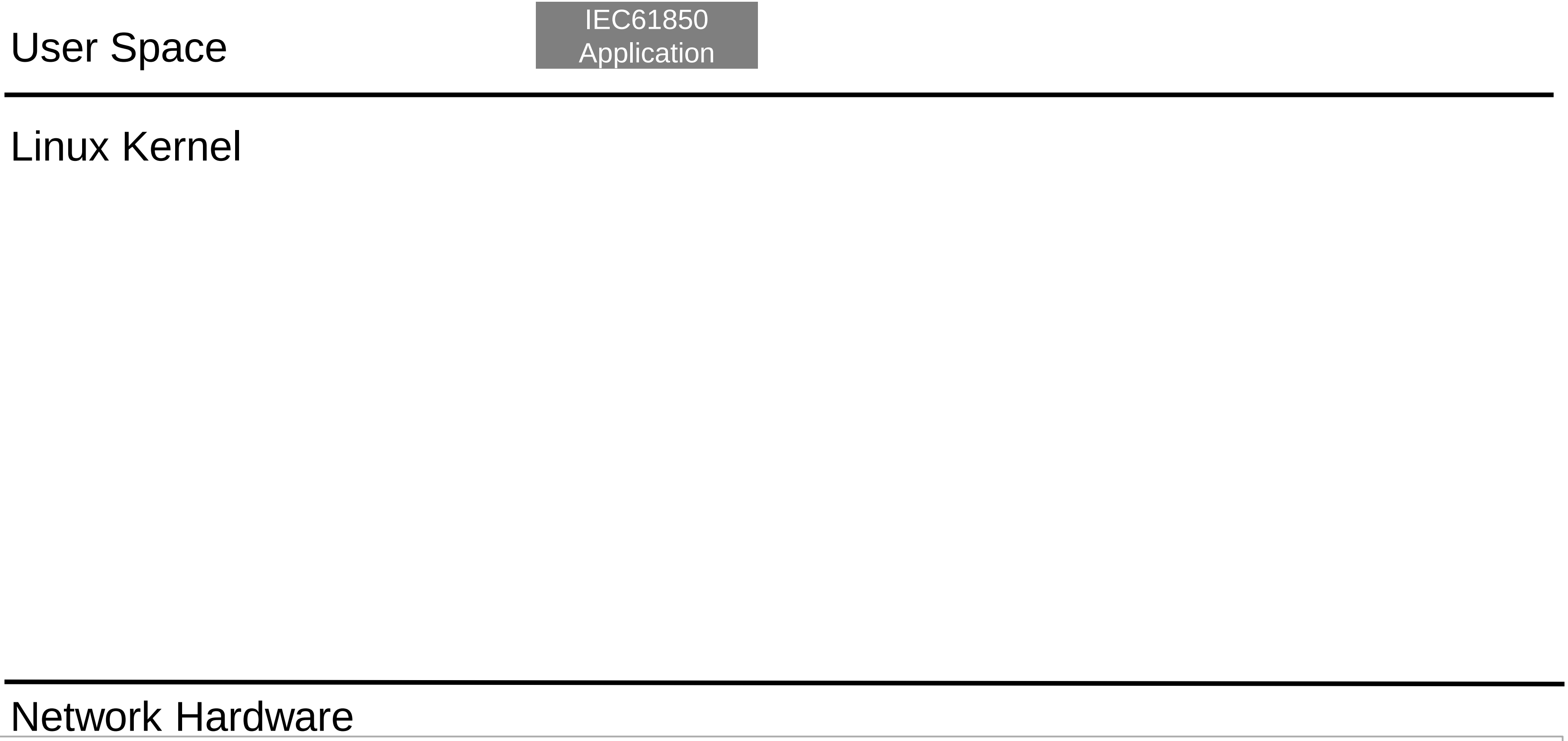
Linux architecture

User Space

Linux Kernel

Network Hardware

Focus on application in User Space



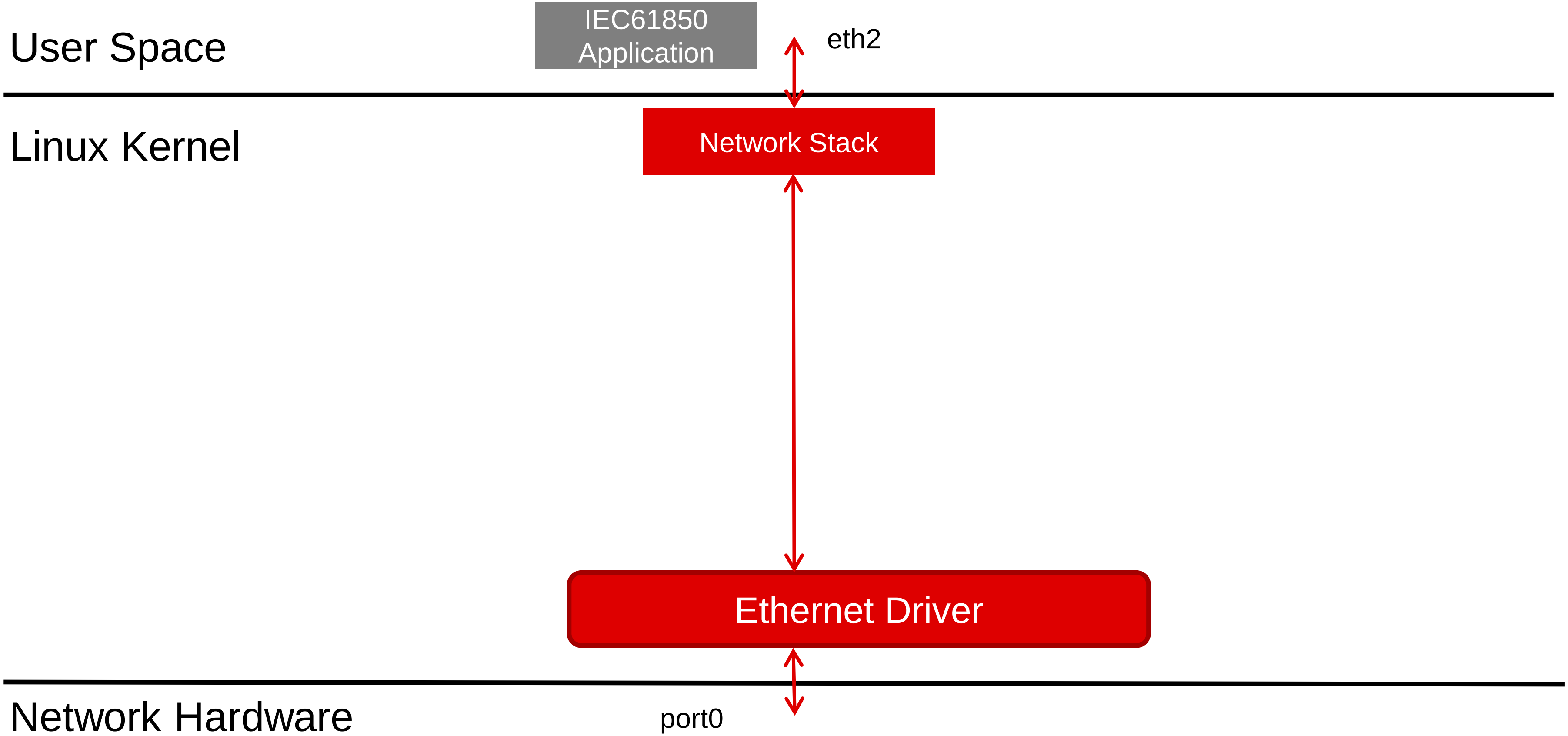
User Space

IEC61850 Application

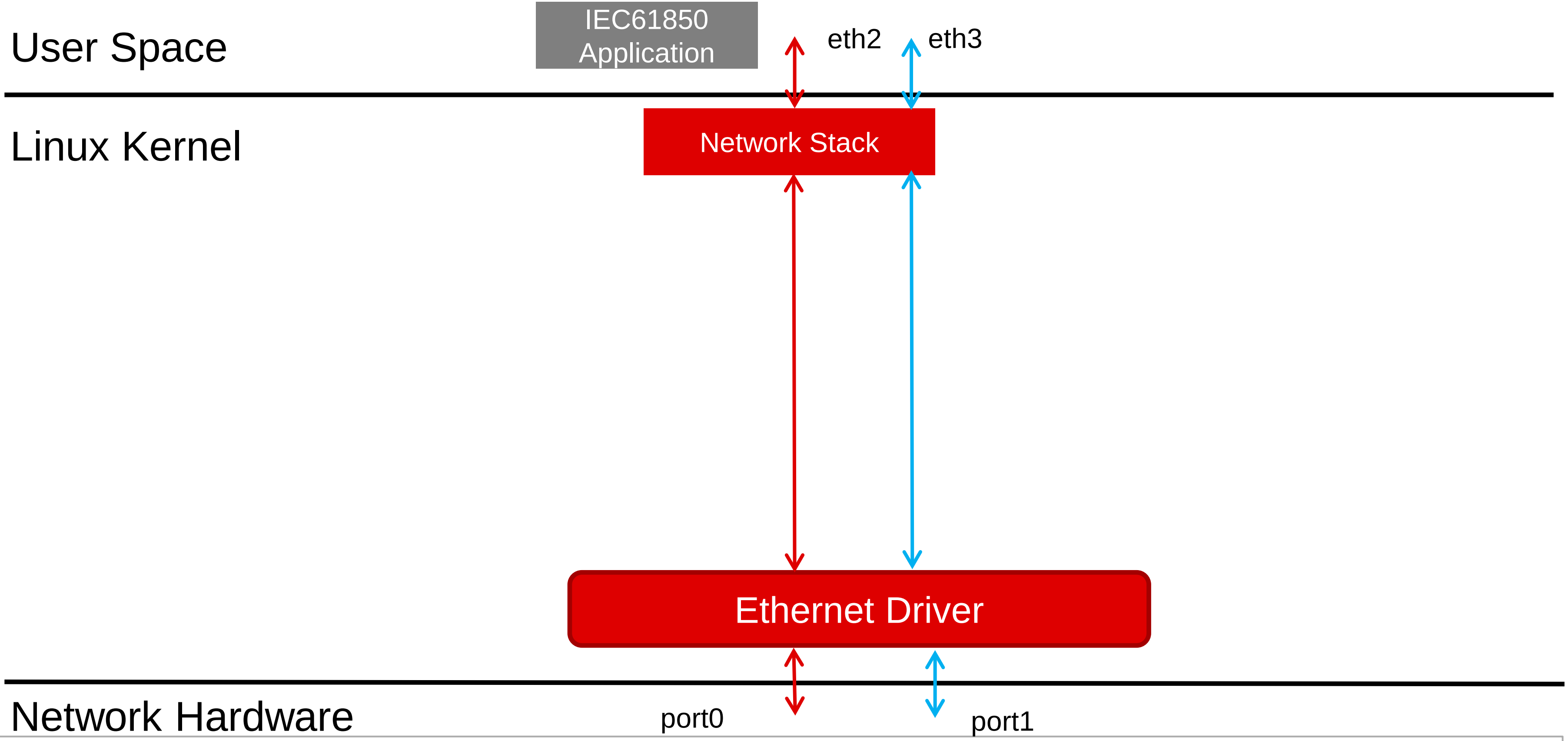
Linux Kernel

Network Hardware

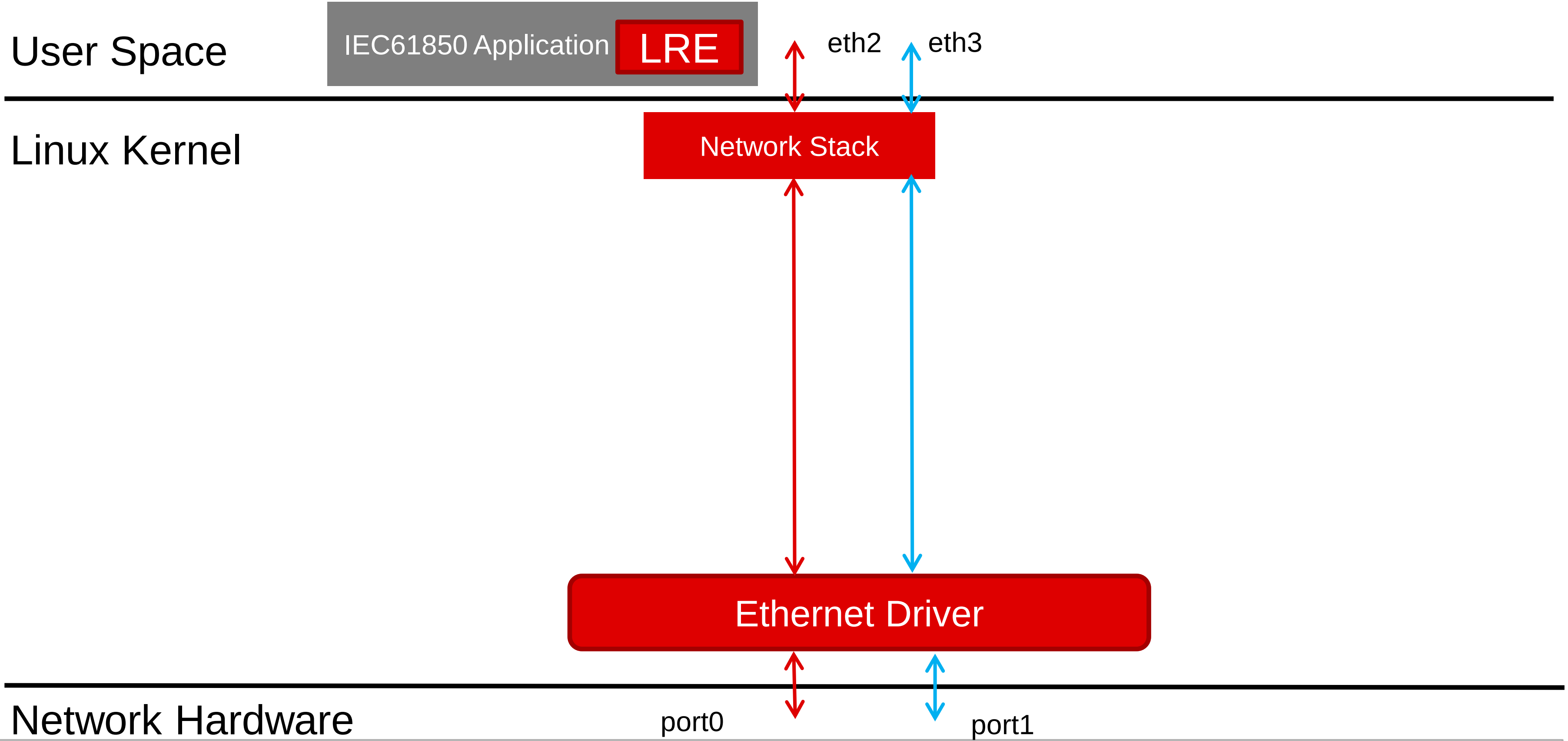
Existing Linux network stack – No redundancy



Adding a second port for redundancy



Need LRE to handle duplicates



User Space

IEC61850 Application

LRE

eth2

eth3

Linux Kernel

Network Stack

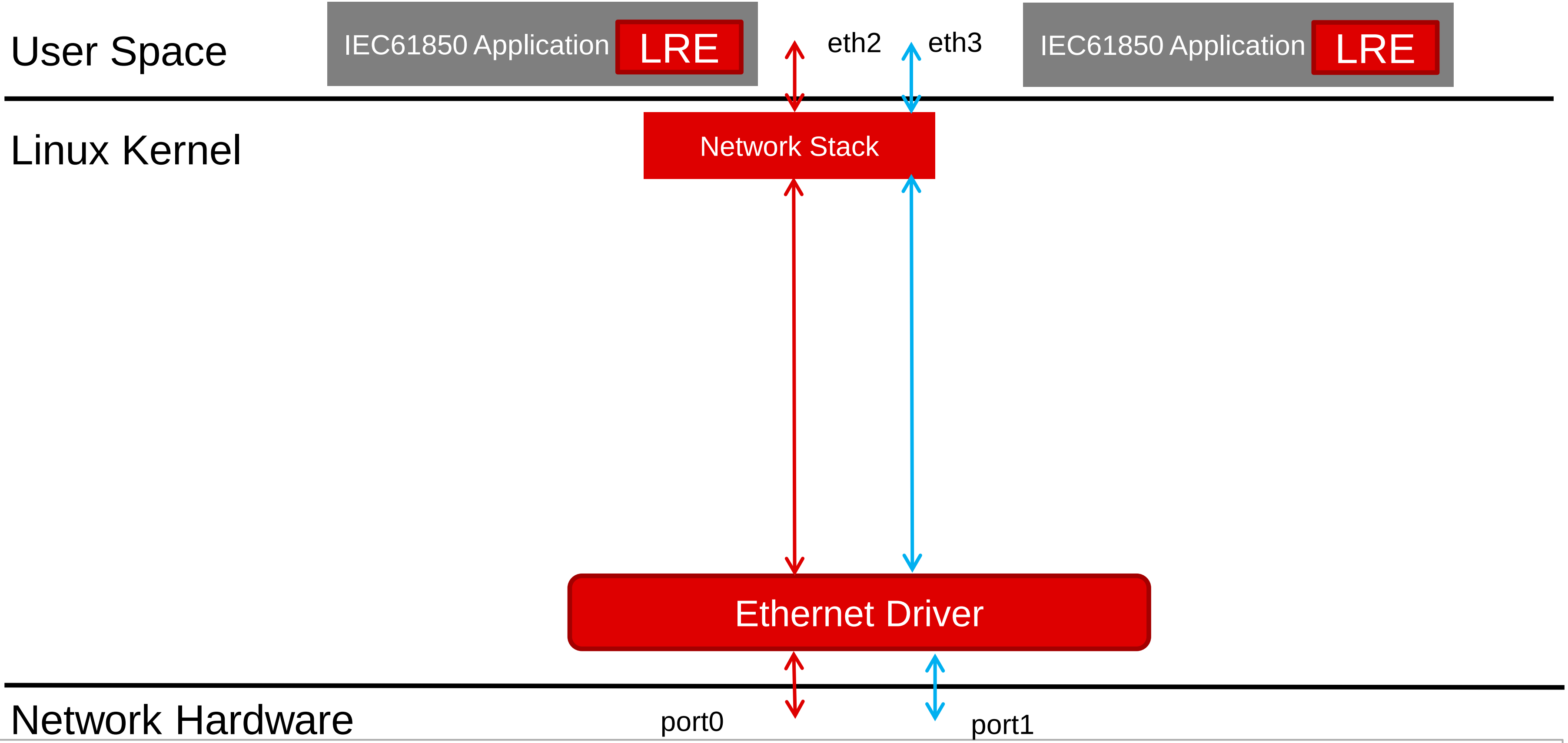
Ethernet Driver

Network Hardware

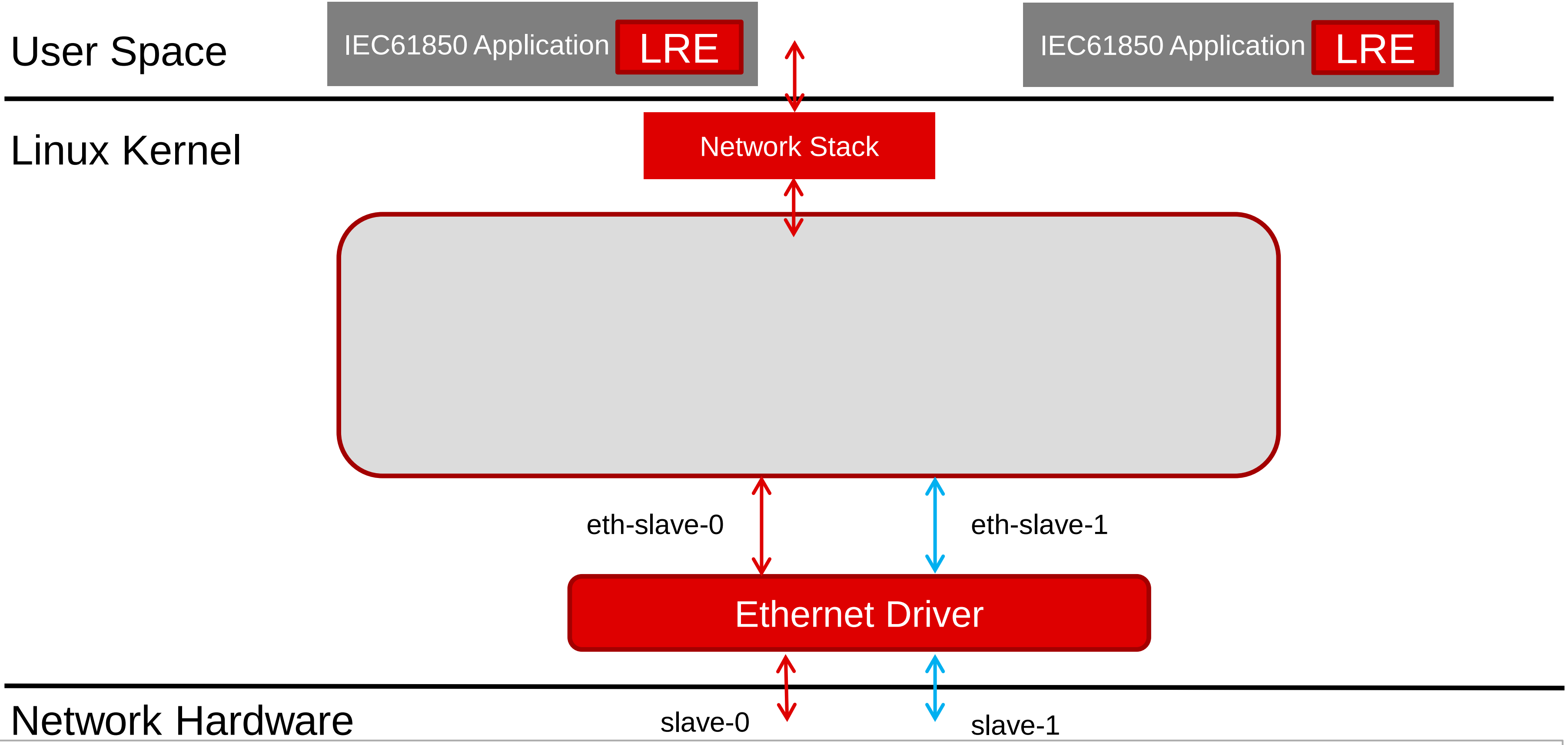
port0

port1

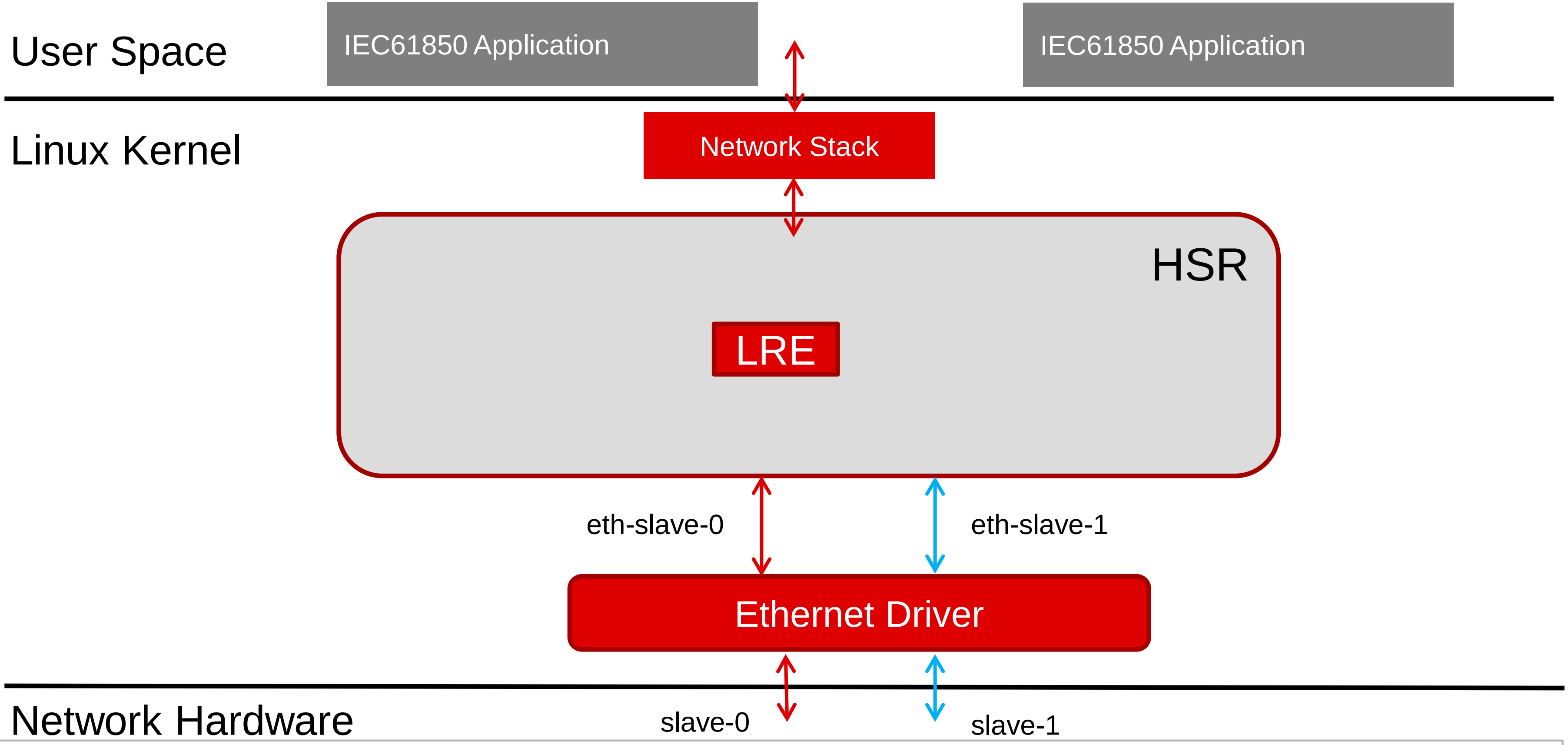
Should we duplicate the LRE?



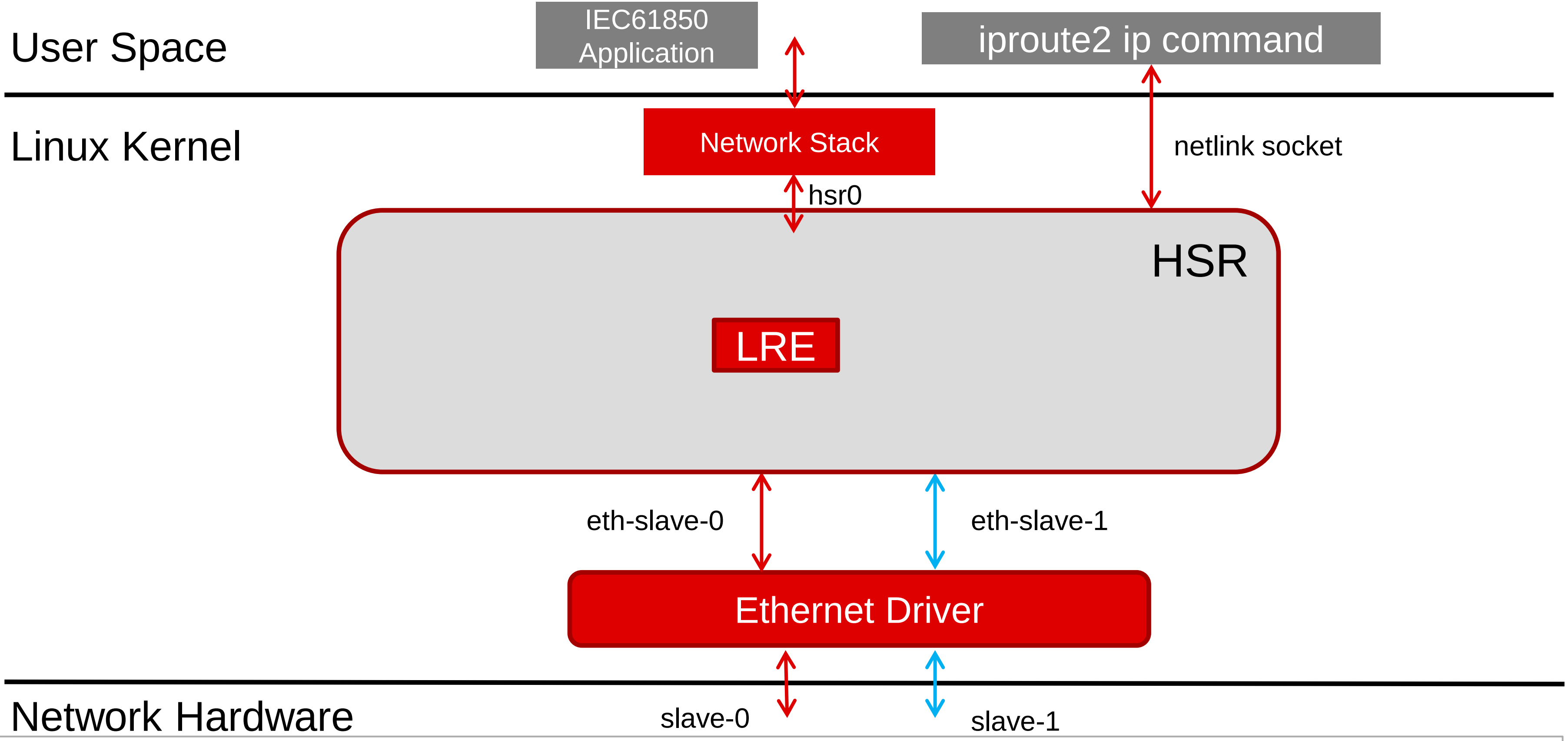
Move the LRE lower in the stack



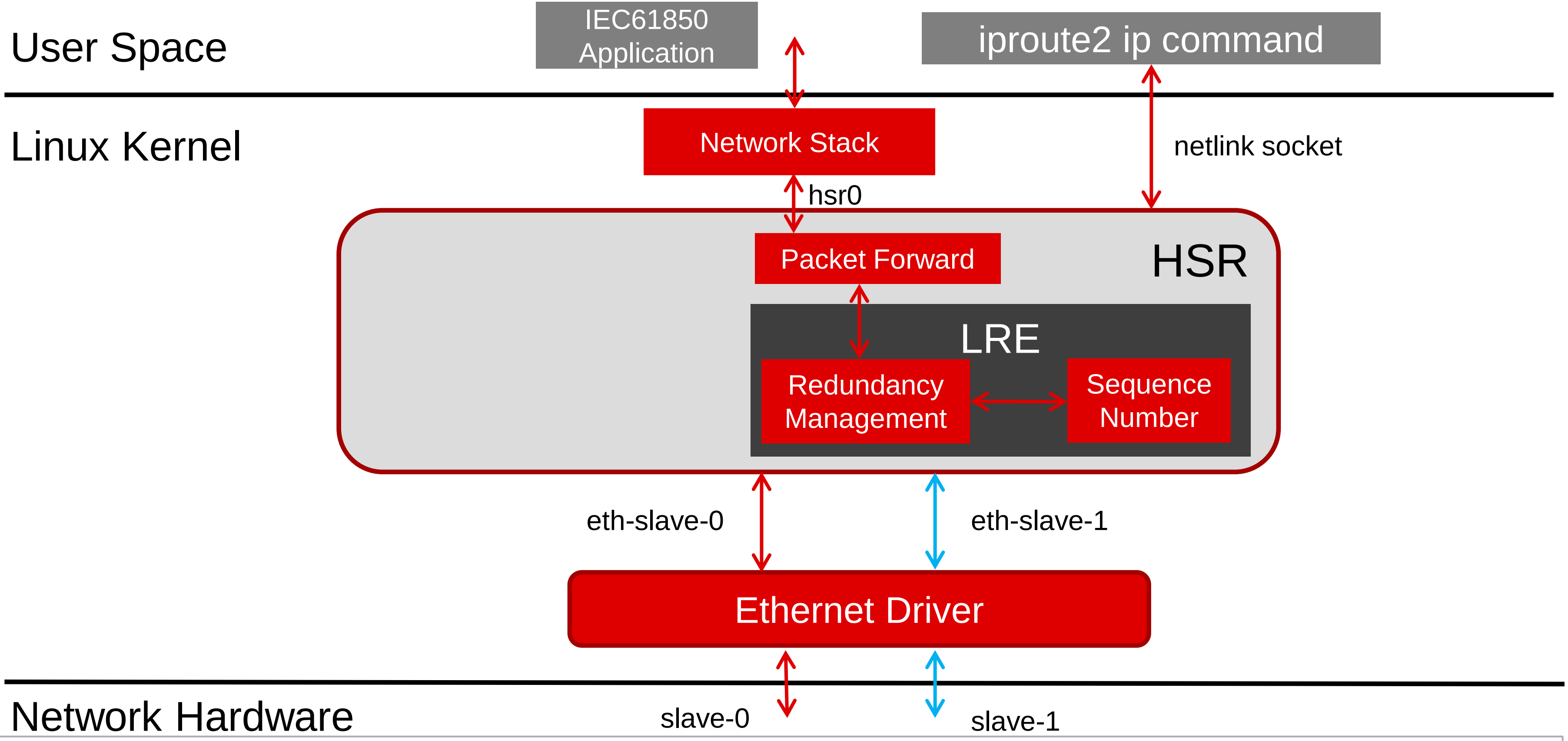
Adding a HSR driver to implement protocols



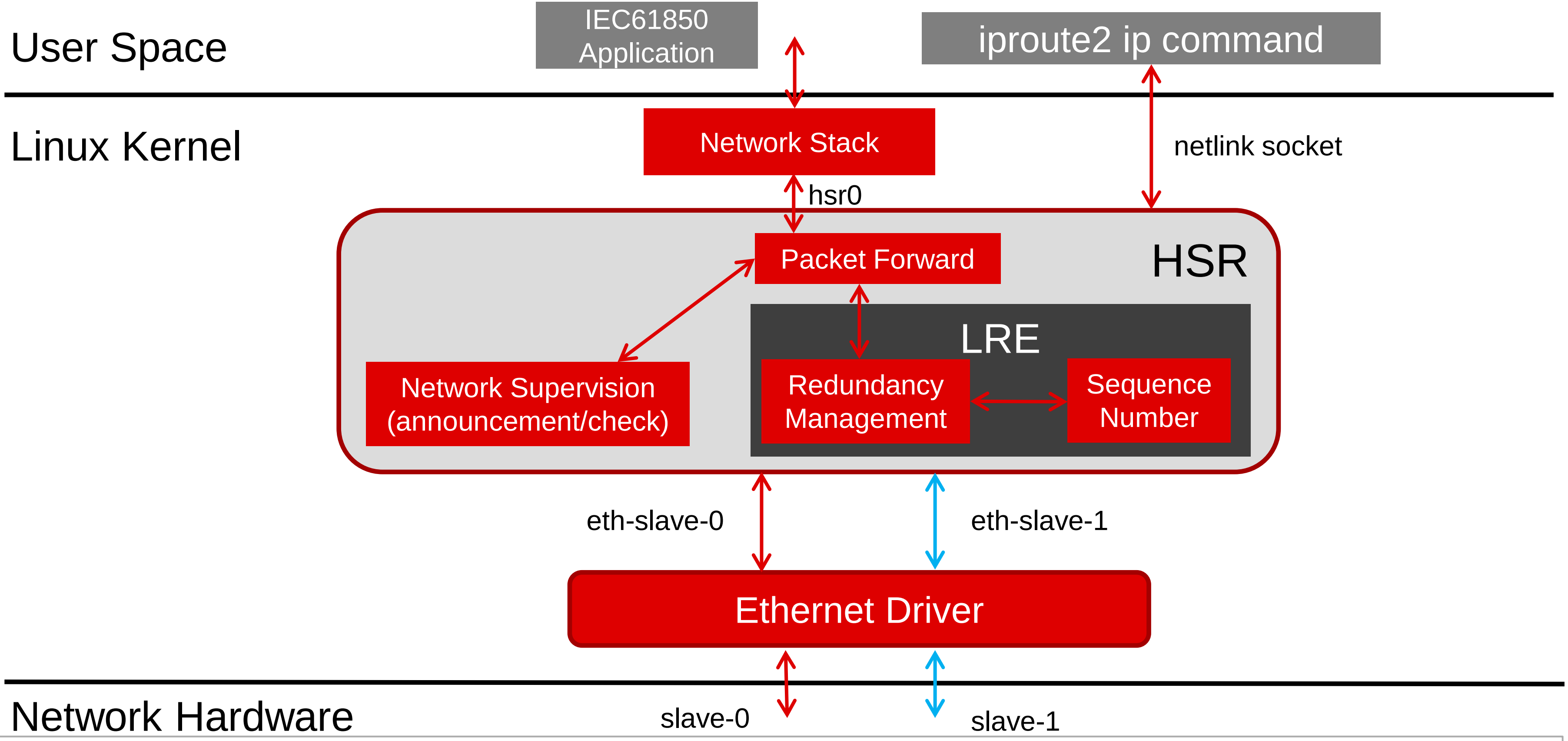
Adding capability to create a HSR connection



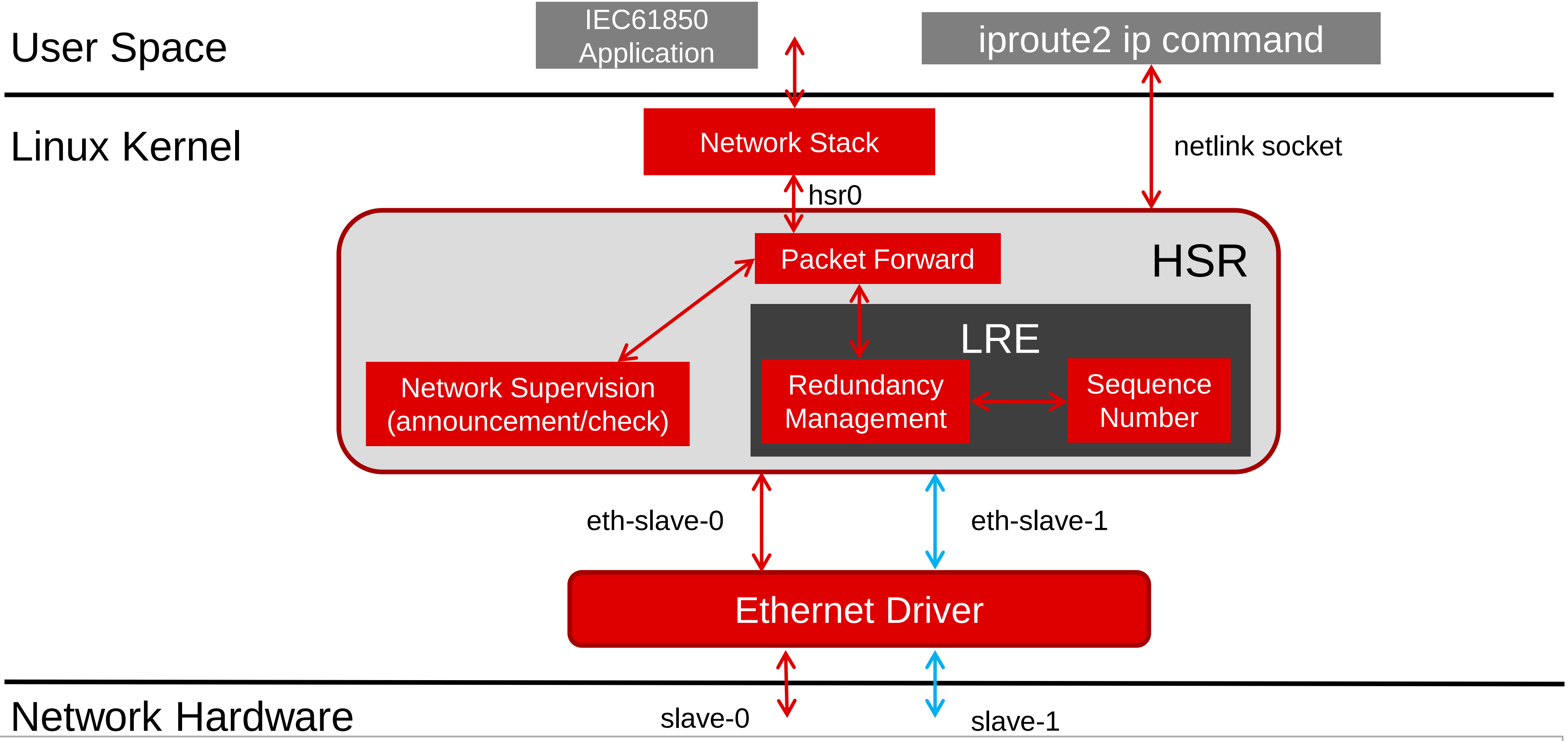
Adding packet forward and LRE



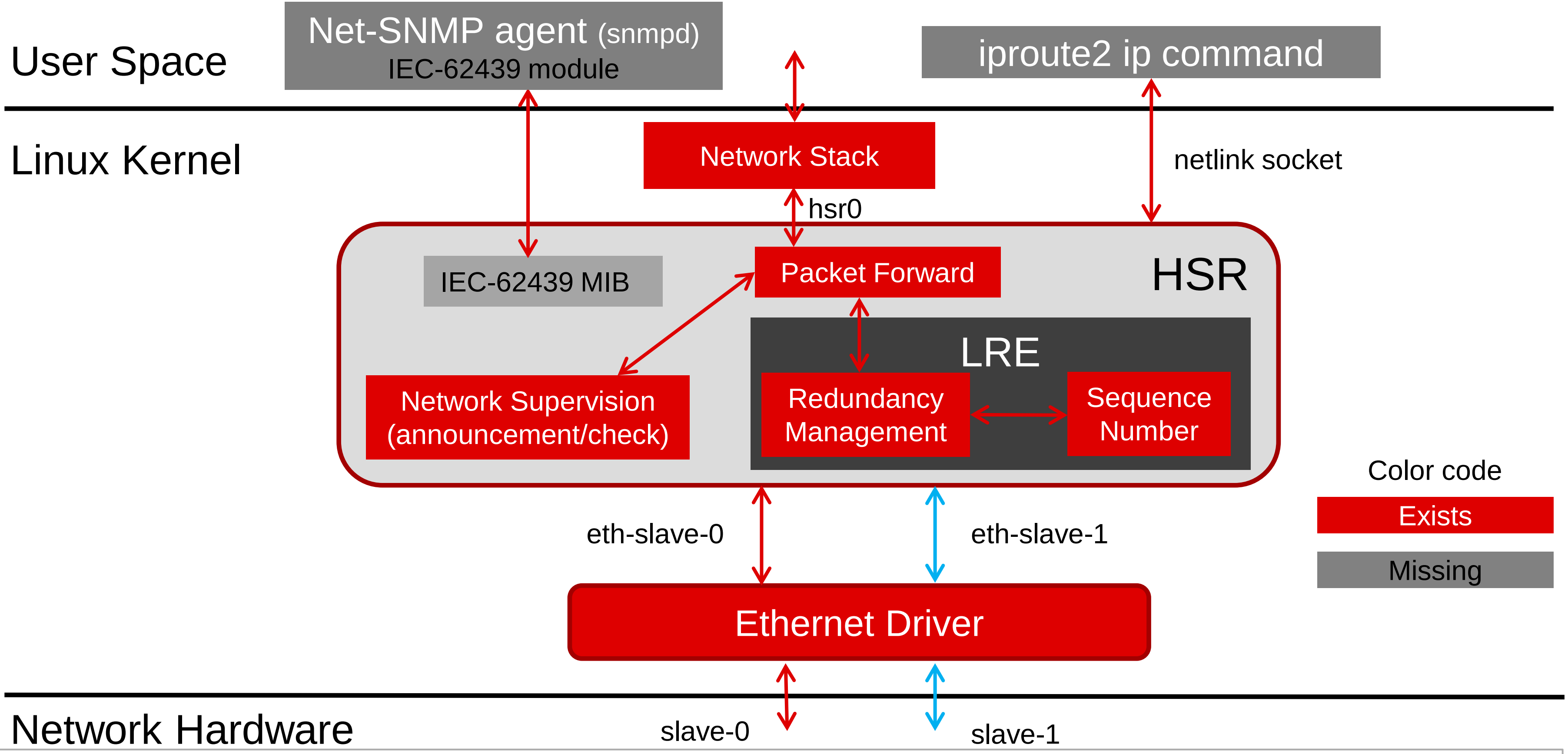
Creating supervisory packets



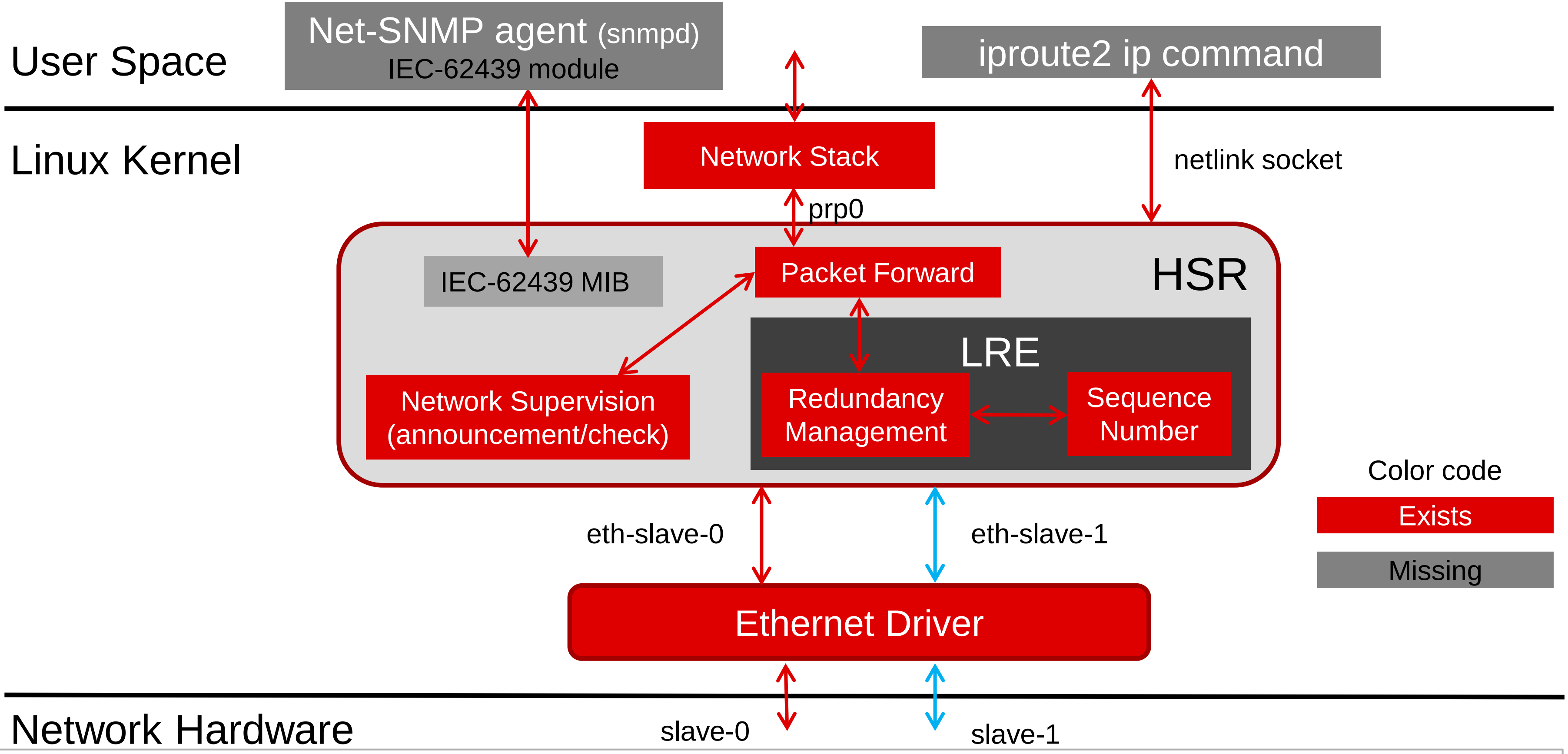
Existing HSR Driver



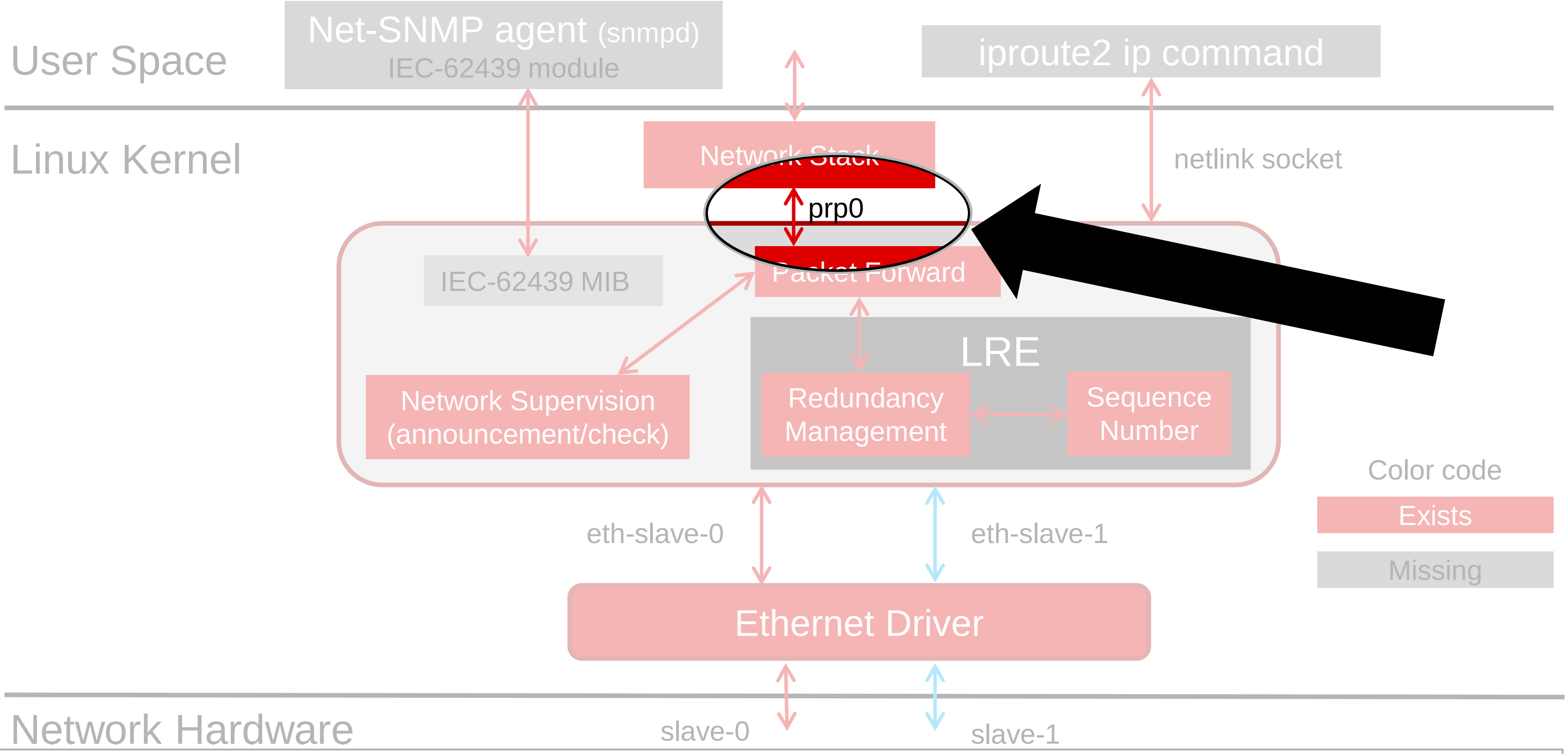
Modifying the HSR driver



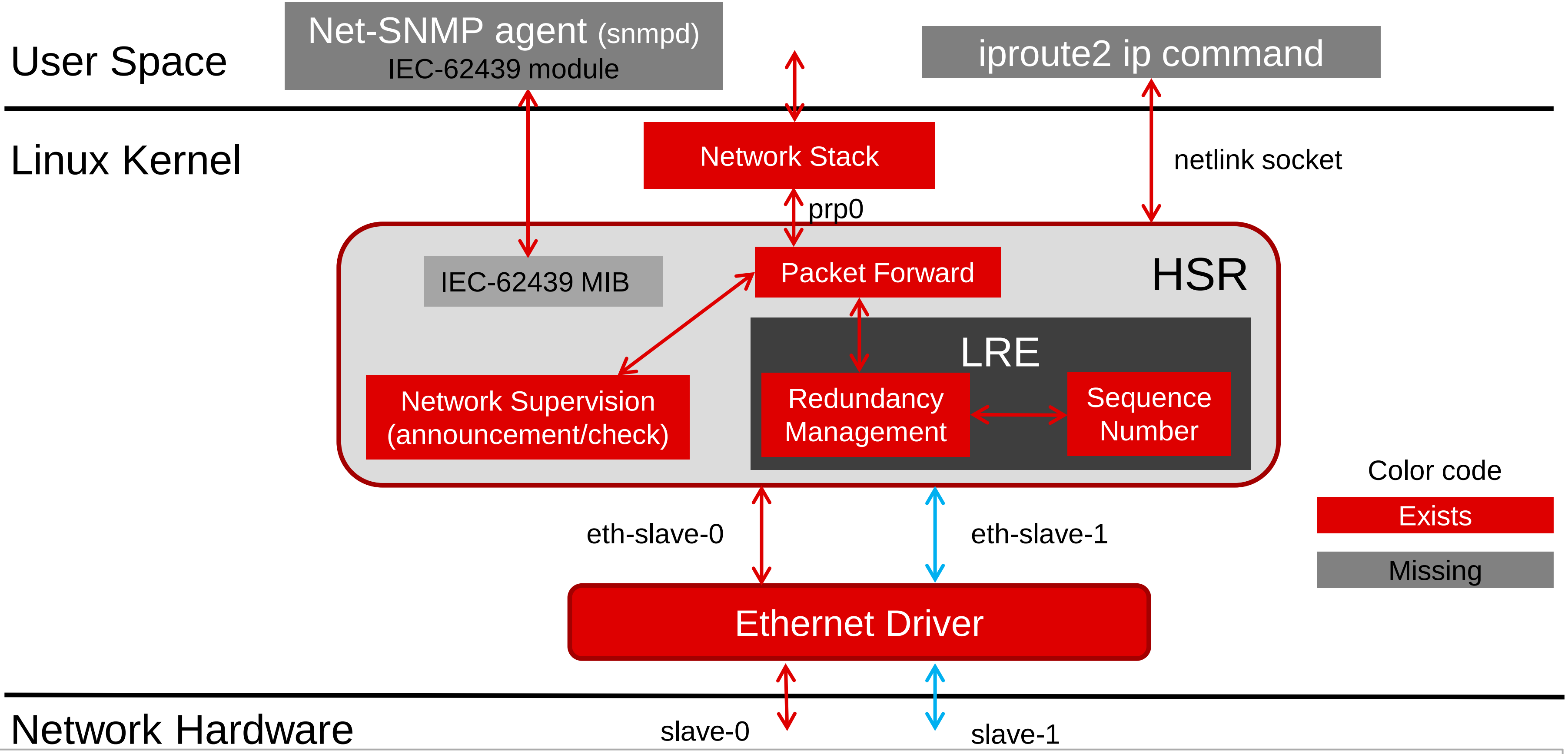
Adding PRP to the driver



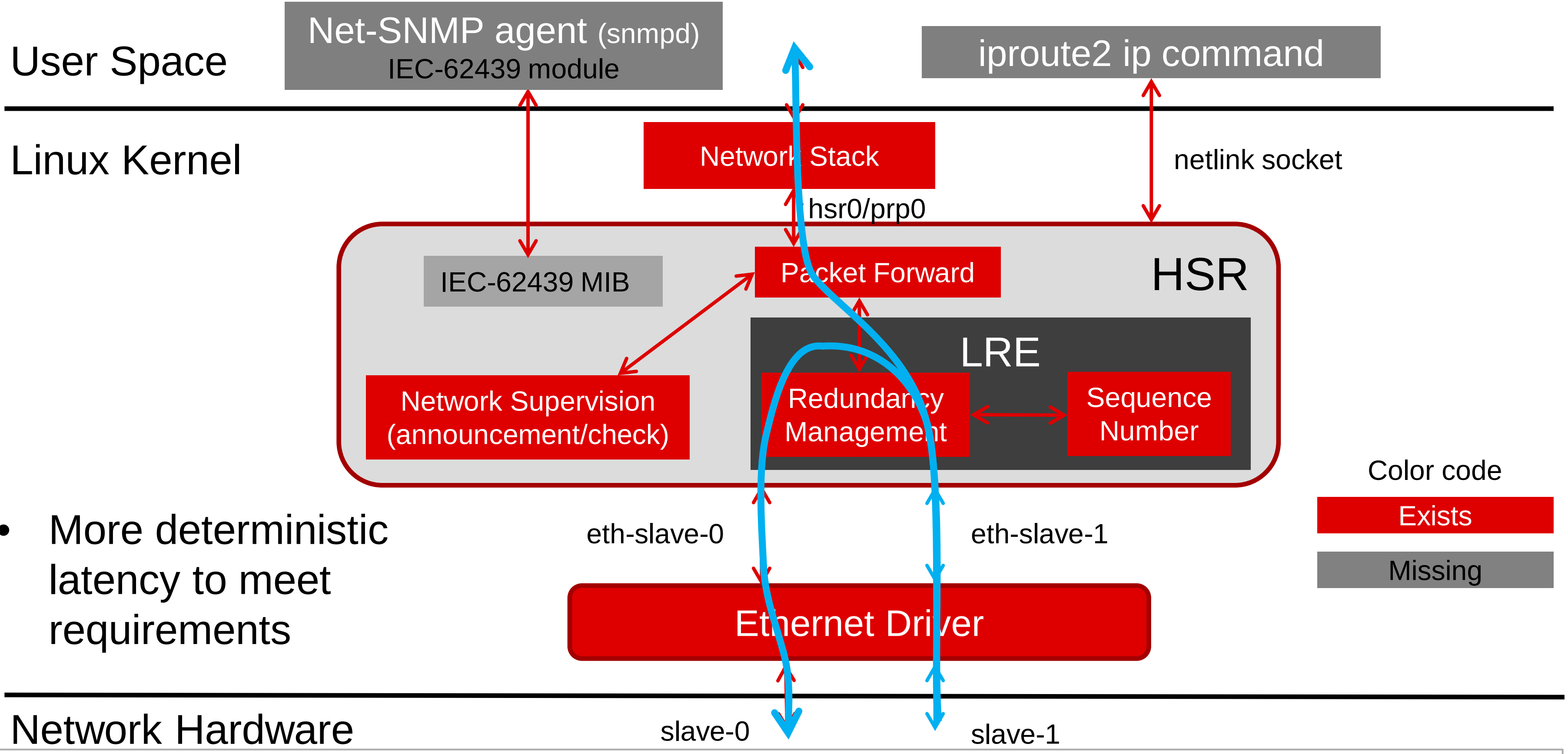
Adding PRP to the driver



Minimal changes for PRP



Why RT Linux?



- More deterministic latency to meet requirements

Section summary

- Given the focus on networking, Linux is a good OS choice
- Redundancy requires at least two ports
- HSR implementation abstracts two ports to one HSR port implemented lower in the stack
- PRP implementation is very similar
- With either implementation, upper software layers (i.e. applications) are abstracted from details
- RT Linux provides more deterministic latencies to meet requirements

For more information

- HSR and PRP on RT Linux Training Series: http://training.ti.com/hsr-prp-rt-linux-training-series
- Sitara Processors Product Overview: http://www.ti.com/sitara
- AM571x Industrial Development Kit (IDK): http://www.ti.com/tool/tmdxidk5718
- AM572x Industrial Development Kit (IDK): http://www.ti.com/tool/tmdxidk5728
- Processor SDK Software Developer Guides:
  - Linux: http://processors.wiki.ti.com/index.php/Processor_SDK_Linux_Software_Developer's_Guide
  - RTOS: http://processors.wiki.ti.com/index.php/Processor_SDK_RTOS_Software_Developer_Guide
- PRP TI Design using TI-RTOS: http://www.ti.com/tool/tidep0054
- HSR TI Design using TI-RTOS: http://www.ti.com/tool/tidep0053
- For questions regarding topics covered in this training, visit the Sitara Processors support forum at the TI E2E Community website: https://e2e.ti.com/support/arm/sitara_arm/f/791