AF_XDP

PR #3314 .

Next (from 25Jan RM call):

1. How applications adopt to AF_XDP? (Now in text below)
2. How could it work in virtualized environments? (Now in text below)
3. How could it work on the same node with another app using DPDK/SR-IOV?

Text WIP before creating PR:

Chapter 3 (before Energy Efficiency)

AF_XDP

Address Family For XDP (AF_XDP) is optimized for high performance packet processing and introduced in Linux kernel v4.18. This new socket type leverages the eXpress Data Path (XDP) in-kernel fast-path to transfer traffic frames from the NIC driver directly to userspace without the need for full network stack. XDP is an Extended Berkley Packet Filter (eBPF) software program.

By using the XDP_REDIRECT action from that XDP program, ingress frames can be redirected to other XDP-enabled network devices. The fastest working mode of operation is Zero-Copy mode in enabled XDP drivers.
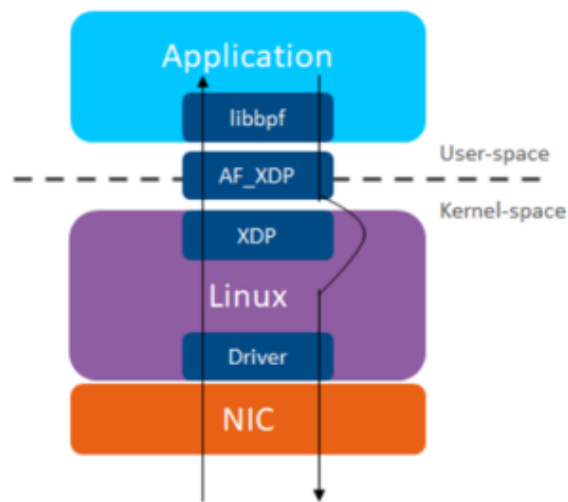

Figure X: AF_XDP architecture

Linux-native applications can open an AF_XDP socket to receive raw packets directly from the NIC, by using libbpf library functions to register a packet buffer area where packets will be located, and to create and bind the socket to a networking interface. DPDK-based applications can use AF_XDP Poll Mode Driver. VPP-based applications can use AF_XDP Device Driver.

In virtualized environments AF_XDP could be used as interface between guest Kernel and user space application, but still need SR-IOV or virtio to get traffic to the VM.

Chapter 5

Exposed Performance Optimisation Capabilities

Ref	Cloud Infrastructure Capability	Unit	Definition/Notes
e.cap.025	AF_XDP	Yes/No	Indicates if Cloud Infrastructure supports AF_XDP

Table 4-2: Exposed Performance Optimisation Capabilities of Cloud Infrastructure

Profiles Specifications & Capability Mapping

Ref	Capability	Basic	High Performance	Notes
e.cap.025	AF_XDP	No	Optional	These Capabilities require workload support for AF_XDP socket type.

Chapter 10 (last)

AF_XDP

Linux-native AF_XDP promises high enough packet processing performance and simplification compared to what SR-IOV and DPDK require for initial installation and later lifecycle management. Still, it will take time till AF_XDP-based solutions are financially invested and matured enough in both Virtualization Infrastructure and Network Functions.