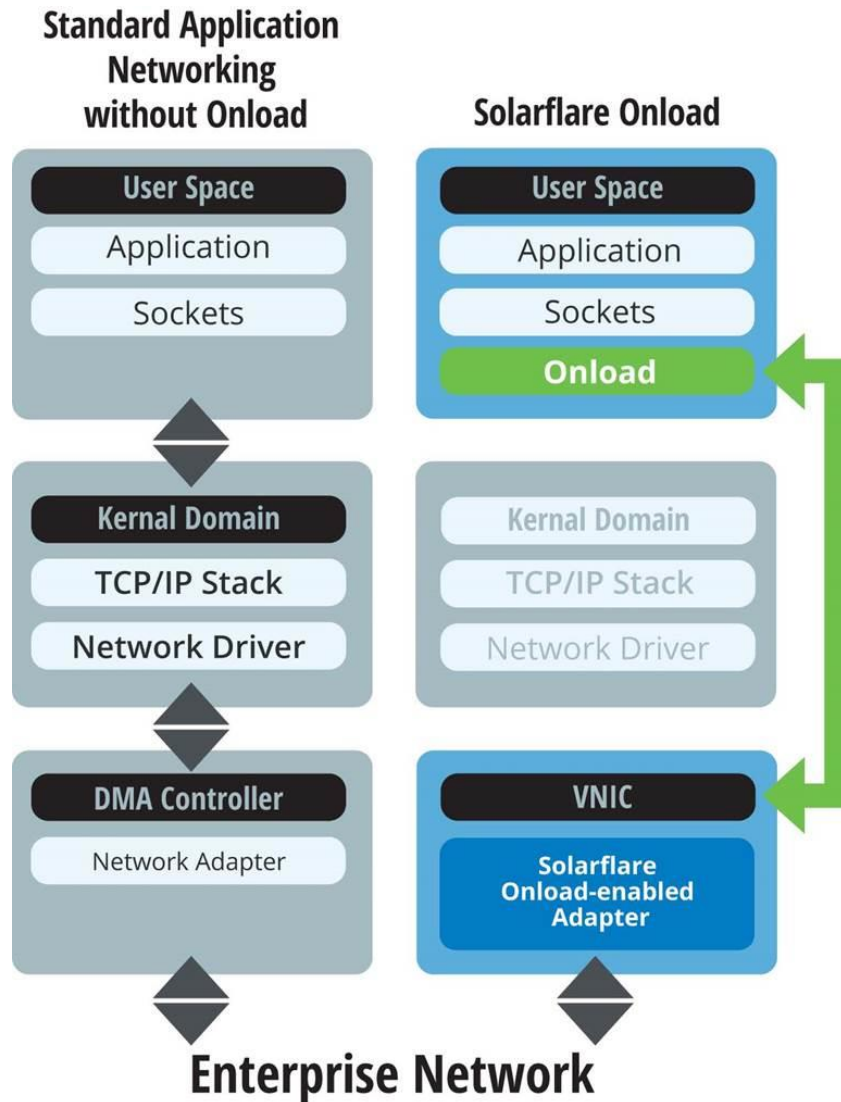


# Onload™ sockets acceleration

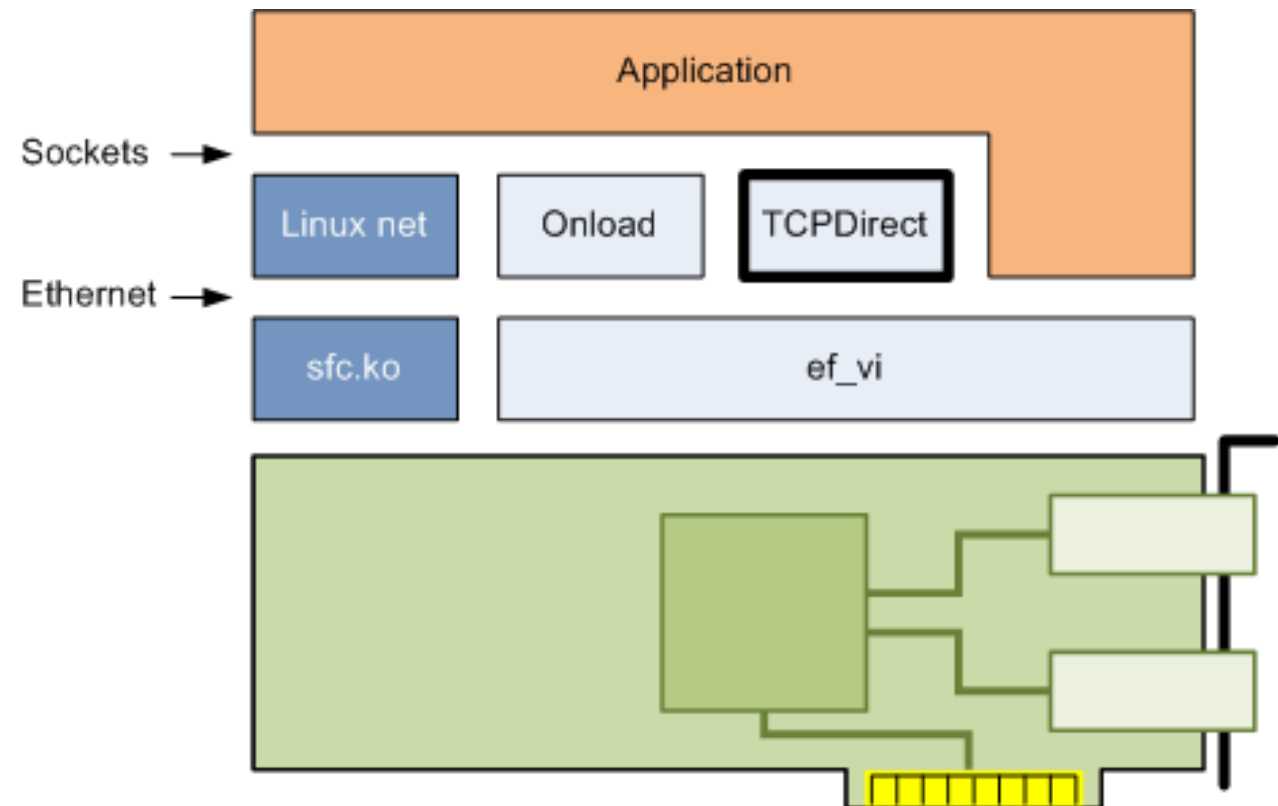


- Onload accelerates:
  - TCP and UDP (unicast and multicast)
  - Pipes
  - TCP and UDP loopback
- Onload is compatible:
  - Standard BSD sockets API
  - No changes to applications needed
  - Standard protocols on the network
- Onload supports all features needed by applications, including:
  - Bonding (active-backup and LACP)
  - VLANs
  - Hardware timestamps
  - Many more...

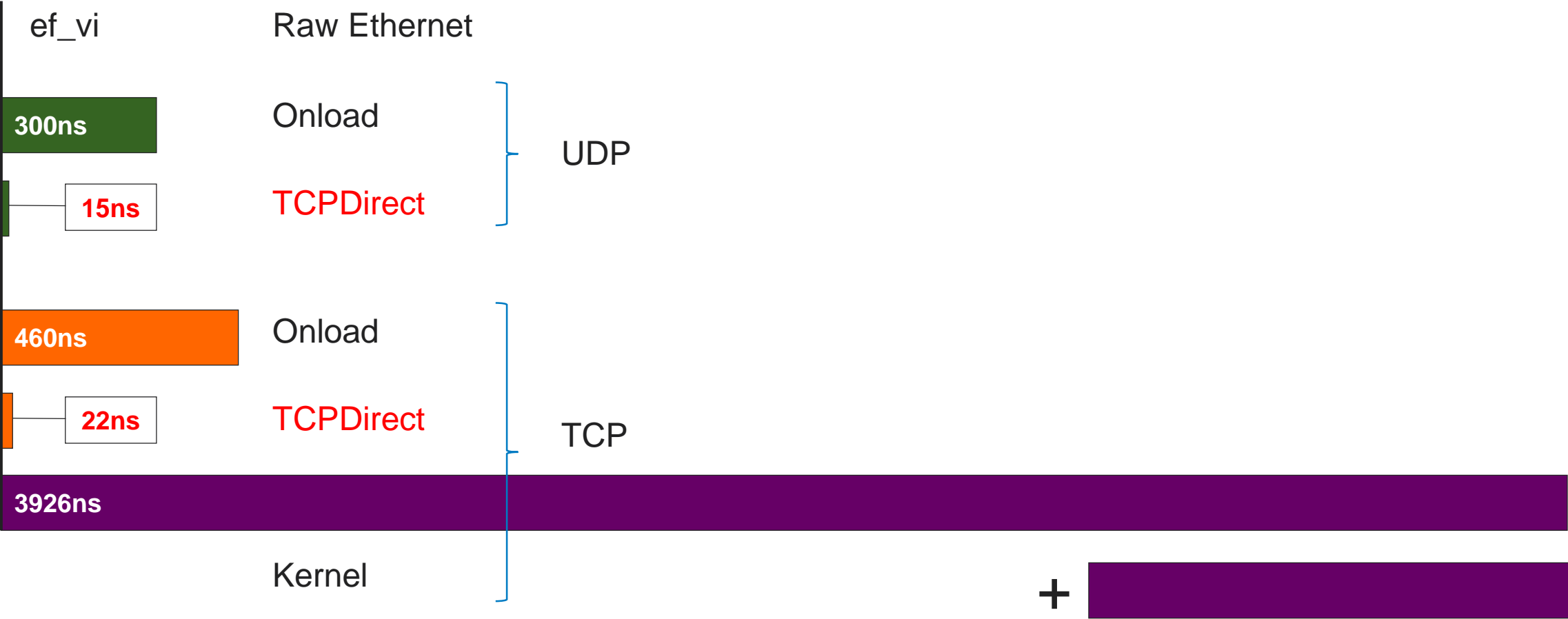
# TCPDirect



- Available on 8522/8542-Onload and 8522/8542-Plus Flareon® Ultra Adapters as part of forthcoming Onload-201610
- Sockets-like API supporting TCP and UDP (unicast and multicast)
- Much lower latency than Onload
- Much easier to use than ef\_vi
- Stable API and ABI



# TCP/IP Stack Latency Contribution (HRT)



*Not STAC Benchmarks*

# TCPDirect features

- Easy to adapt code from BSD sockets API
  - Analogues for standard calls: socket, bind, listen, accept, send, recv, epoll
- Almost all data-path calls are non-blocking
  - Suitable for event-driven programming models
- Zero-copy receive
  - Maximum efficiency, especially when filtering
- Integrated with OS control plane
  - Supports VLAN interfaces
- Multiplexer to support multiple sockets
- 'Waitable FD' for integration with select/poll/epoll

# Limitations



- Only available on 8000-Onload/Plus Flareon Ultra Adapters
- Features in Onload that are *not* in TCPDirect
  - Bonding
  - Concurrency
  - Timestamps
  - Wire-order delivery API (WODA)
  - TCP delegated sends
  - Mixed accelerated/un-accelerated sockets
  - Socket caching, clustering and scalable active open
- Other limits in TCPDirect
  - Maximum of 64 'zockets' of each type per stack
  - TCPDirect stacks are not individually multi-thread safe

# Summary



- Focused on delivering the lowest possible latency between the application and the network
- TCPDirect stack latency contribution (HRT)
  - UDP ~15ns
  - TCP ~22ns
- Available on 8000-series Flareon Ultra –Onload/Plus adapters in the forthcoming version of Onload
- Can co-exist with Onload in the same application

**Thank you for listening!**

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