



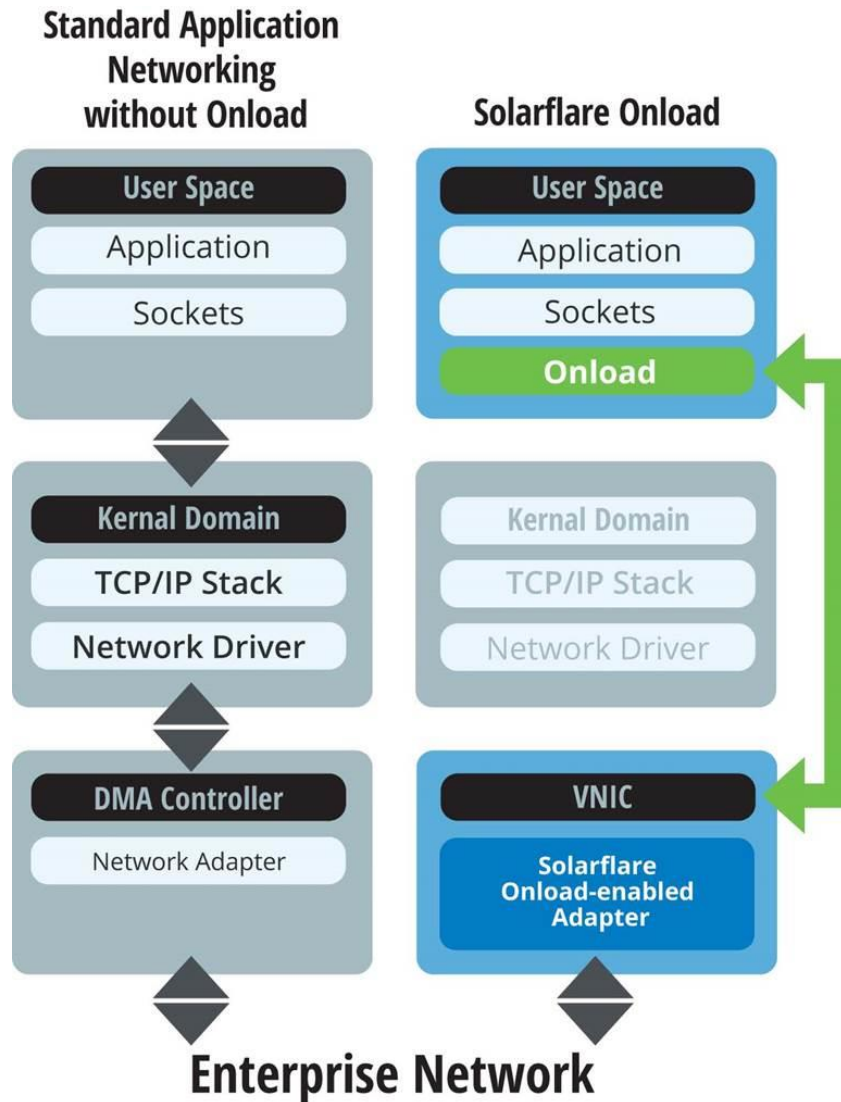
Introducing TCPDirect

How to supercharge your ultra-low-latency
TCP and UDP processing

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Onload™ sockets acceleration

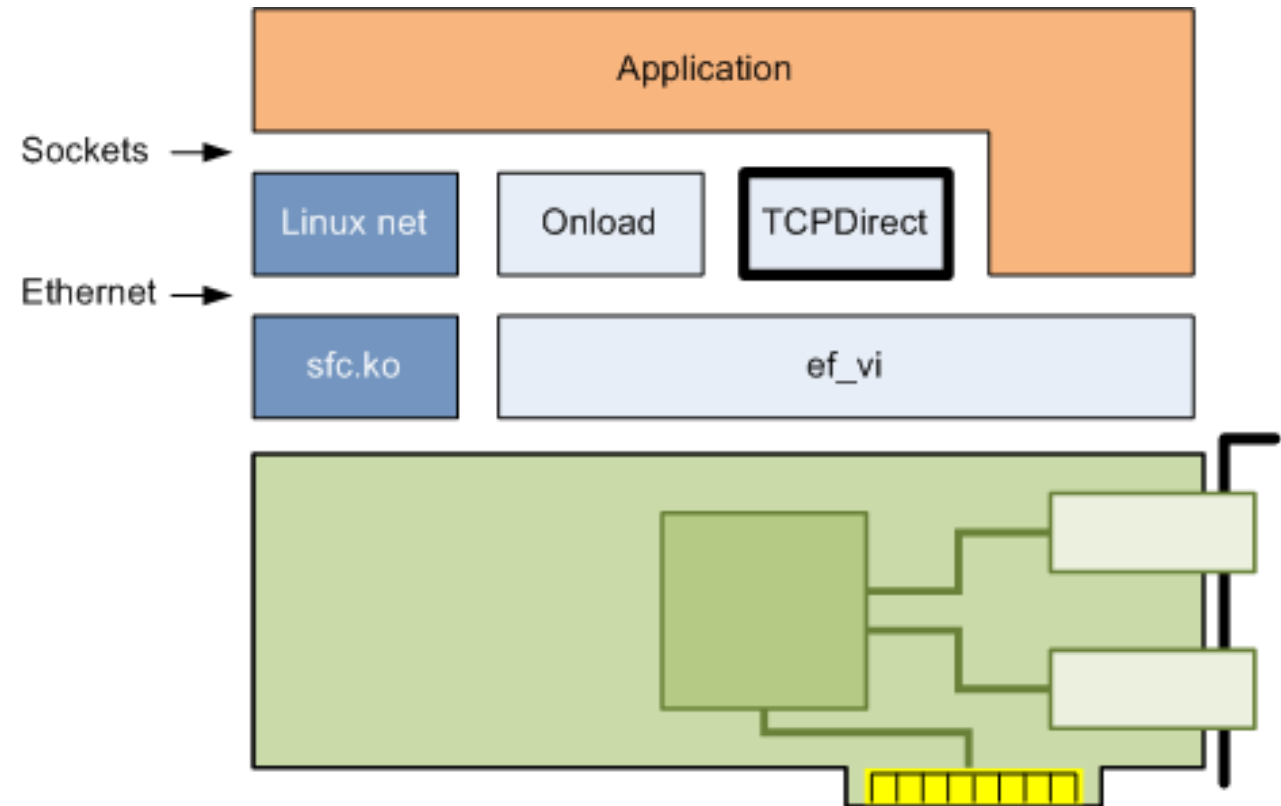


- Onload accelerates:
 - TCP and UDP (unicast and multicast)
 - Pipes
 - TCP and UDP loopback
- Onload is compatible:
 - Standard BSD sockets API
 - No changes to applications needed
 - Standard protocols on the network
- Onload supports all features needed by applications, including:
 - Bonding (active-backup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

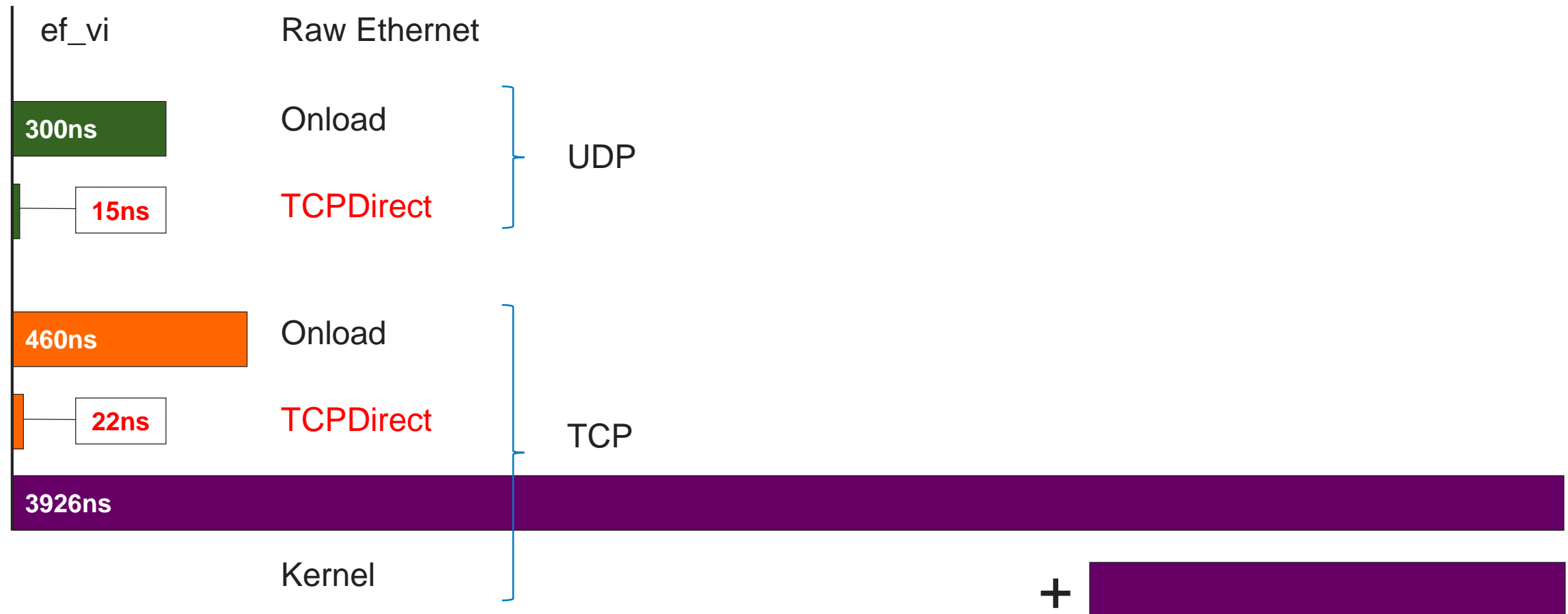
TCPDirect



- 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 'sockets' 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!

**Contact me for additional information:
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