

Smart SFP

Introduction

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Company overview

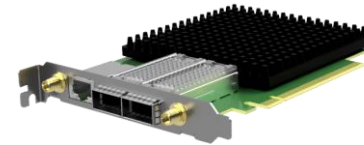
- Established in 2013
- 30+ employees
- Moscow – Sales & Management
- Saint Petersburg – R&D and manufacturing
- UK – International sales
- Germany – International warehouse
- Sales channels – Service providers (Fixed, Wireless), System Integrators, VAR, OEM
- Target markets – Europe, US, Canada



Portfolio



Smart SFP



Smart NIC

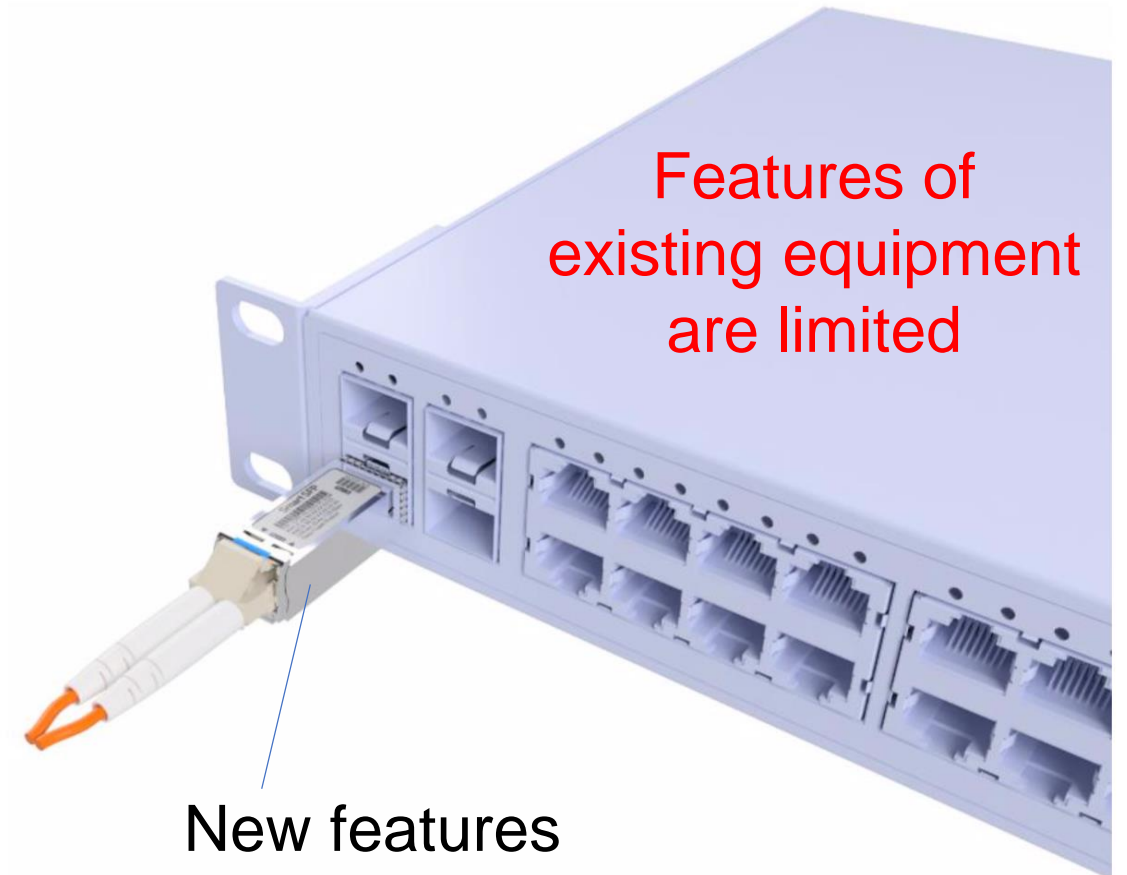
Agenda

- Problems to solve
- Why Smart SFP?
- Architecture
- Product overview

Problems to solve

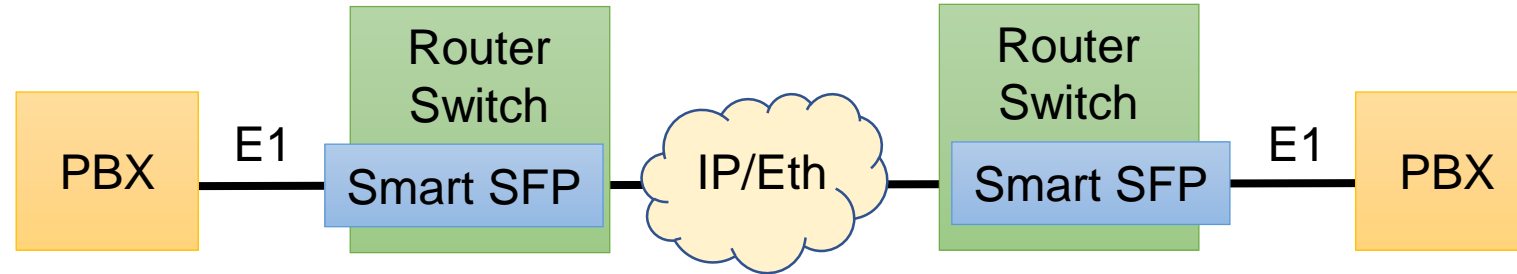
Extension of the existing equipment features

- Interfaces
 - SDH/PDH
 - DSL
 - SDI
- Technologies and protocols
 - SDH/PDH over IP/Ethernet
 - IP/Ethernet over SDH/PDH
 - Monitoring and measurement
 - Precision network time server
 - OTDR
- Addition data processing
 - In-band Network Telemetry (INT)
 - P4
- Offloading
 - VXLAN GW (VTEP)

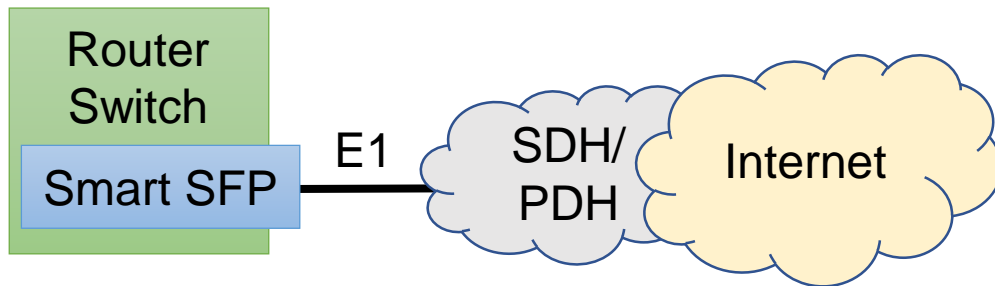


Problems to solve - examples

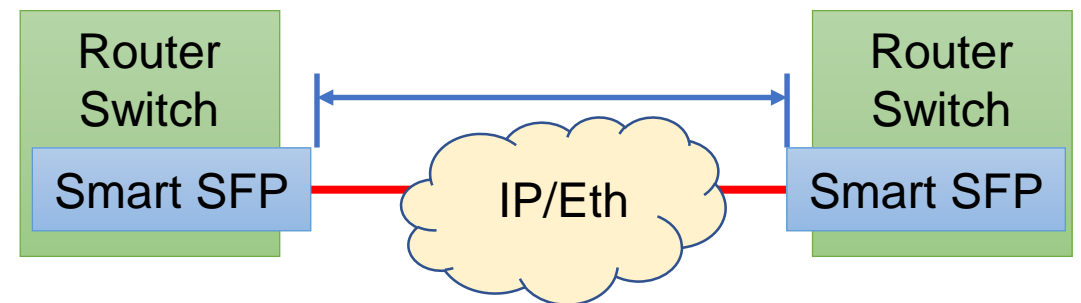
SDH/PDH over IP/Ethernet



IP/Ethernet over SDH/PDH

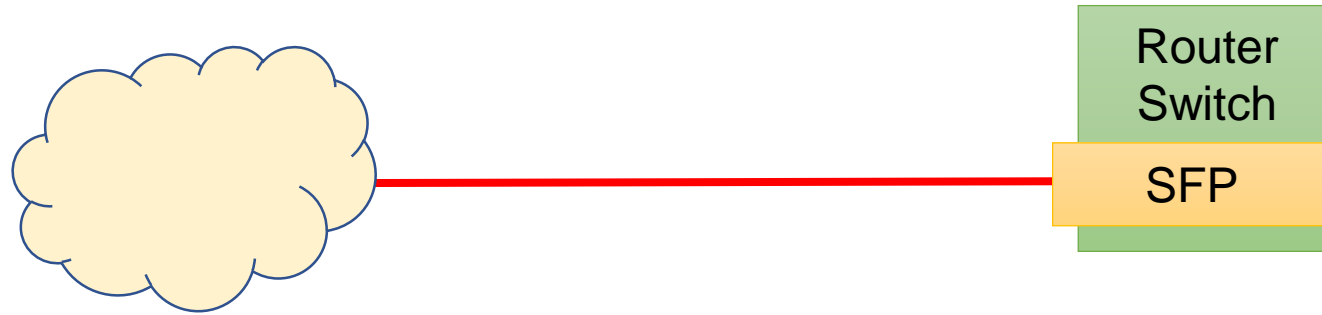


IP SLA monitoring

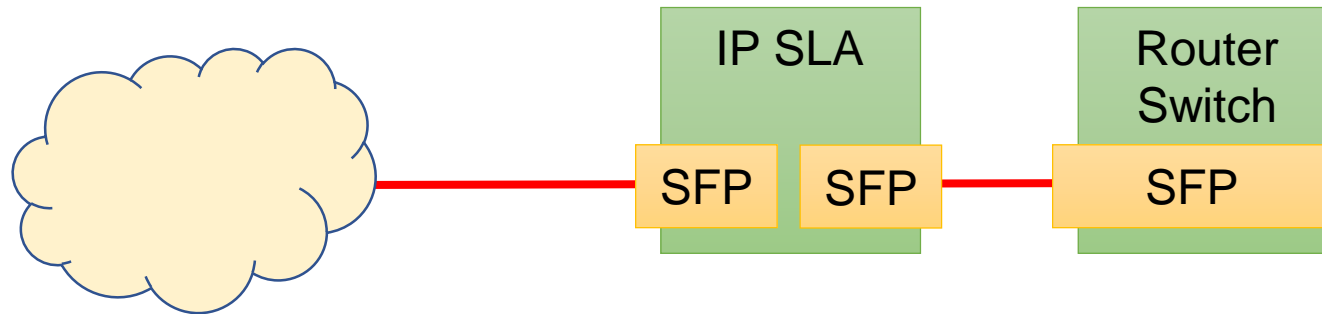


Why Smart SFP?

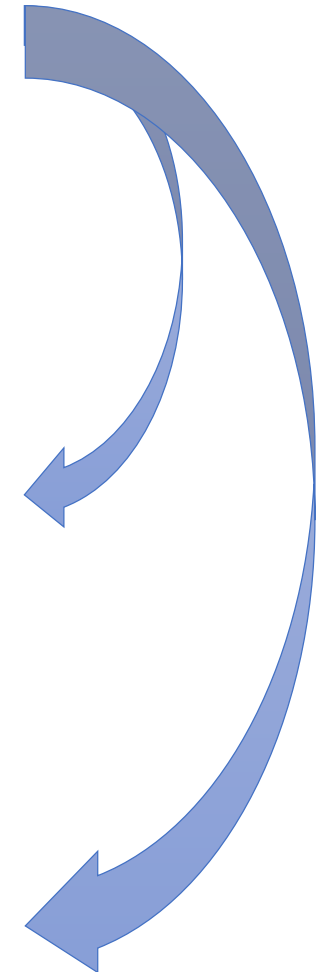
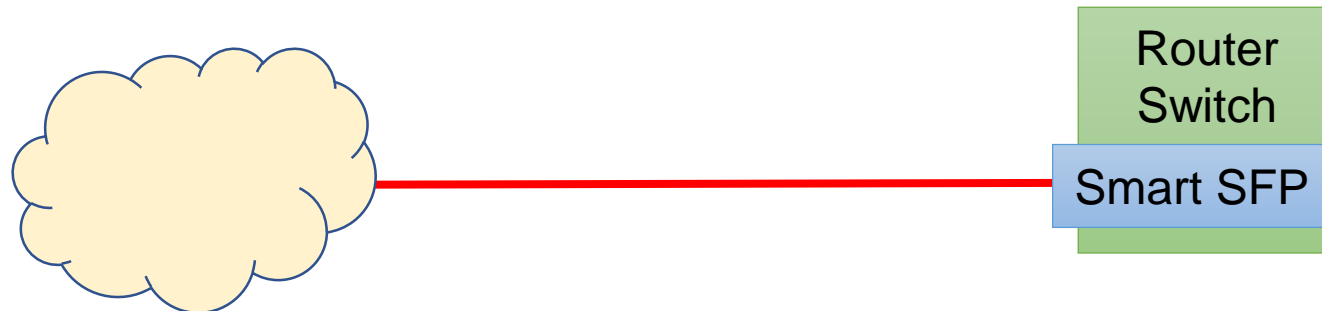
Existing scheme



Traditional feature extension approach



Smart SFP feature extension approach



Why Smart SFP?

Technical and economical reasons:

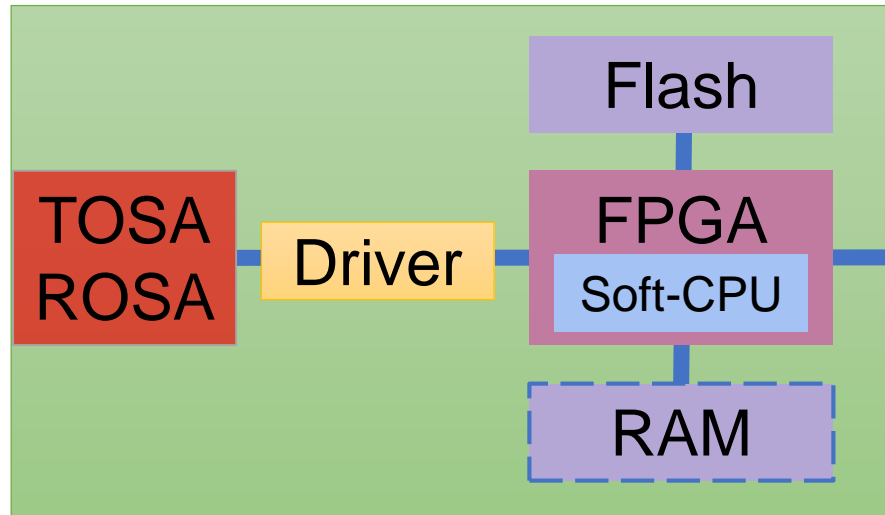
- Cheaper than standalone device, there are no unnecessary ports/features which increase the price
- Cheaper than changing the existing device to the new model
- Cheaper than activating new features in the existing device
- Very small possibility of custom feature development for the existing devices
- No free space in the rack

Administrative reasons:

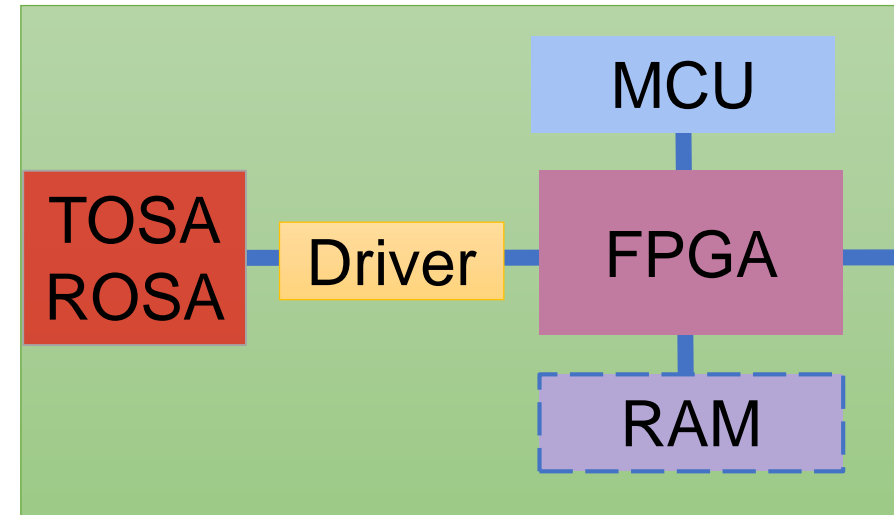
- No additional agreement needed to connect to electricity, cable infrastructure, rack place
- Allows to use simplified procurement procedure – buy as SFP not as SLA probe
- Allows to perform procedures as upgrade of existed device instead of purchase a new one
- Allows not to certify existing devices

”Classic” Smart SFP module architecture

FPGA and Soft-CPU



FPGA and MCU



Soft-CPU/MCU limitations:

- Low performance
- Lack of standard software
- Software development and debugging are complicated
- Integration of customer's software aren't possible

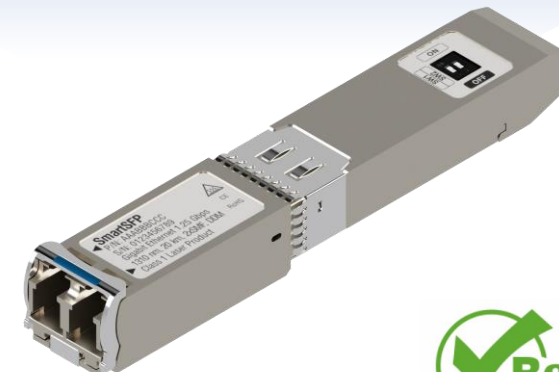
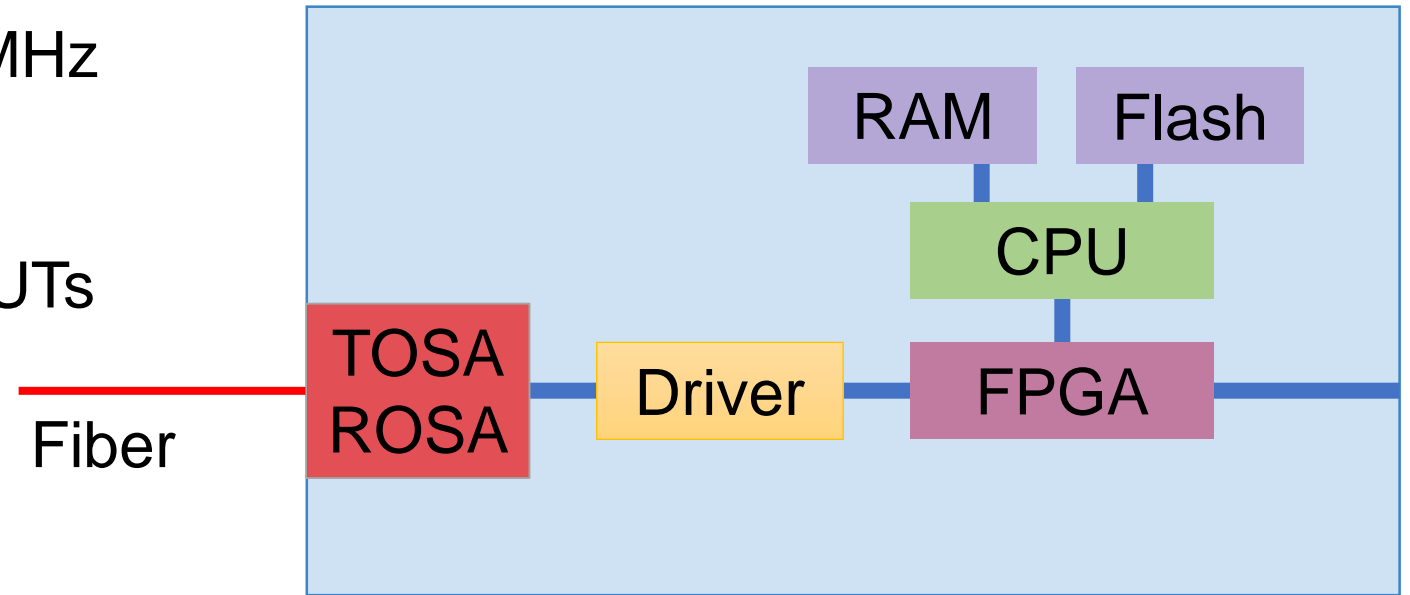
Smart SFP architecture – Hardware

Complete computing system:

- CPU: ARMv7, 1 core, up to 900 MHz
- RAM: DDR3 up to 1 GB
- Flash: eMMC up to 8 GB
- FPGA: Lattice ECP5 up to 85K LUTs

Features:

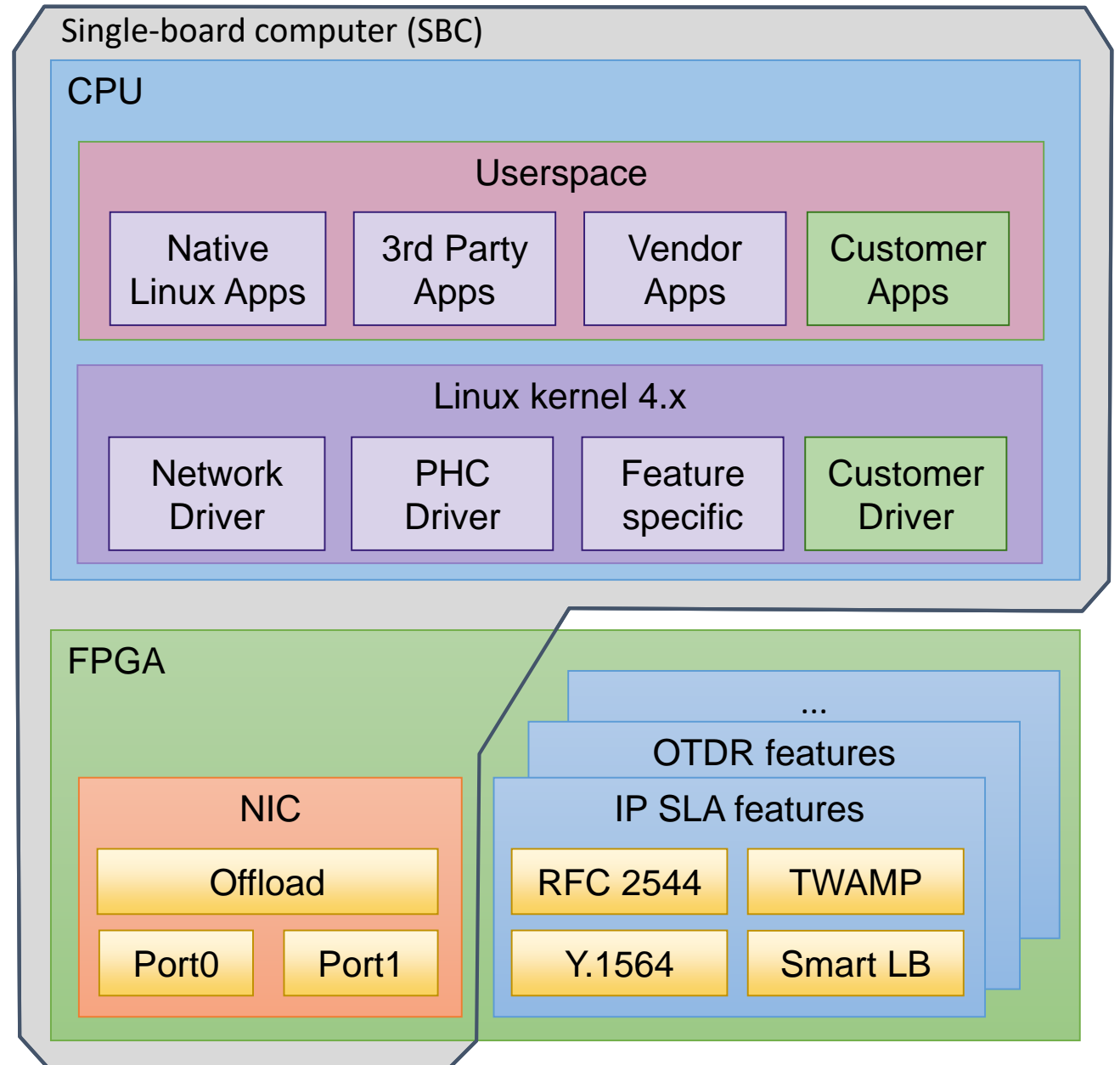
- Linerate 1 Gbit/s
- Dual fiber – 1310 nm
- Single fiber – 1310/1550 nm
- CWDM (optional)
- Up to 20 km (LX), optional up to 80 km (EX, ZX)
- RJ-45 copper, 10/100/1000BASE-T
- Digital Diagnostics Monitoring (DDM)
- Multi-vendor compatibility (brand-equivalent P/N, EEPROM IDs)



Smart SFP architecture – Software

Advantages of using Linux:

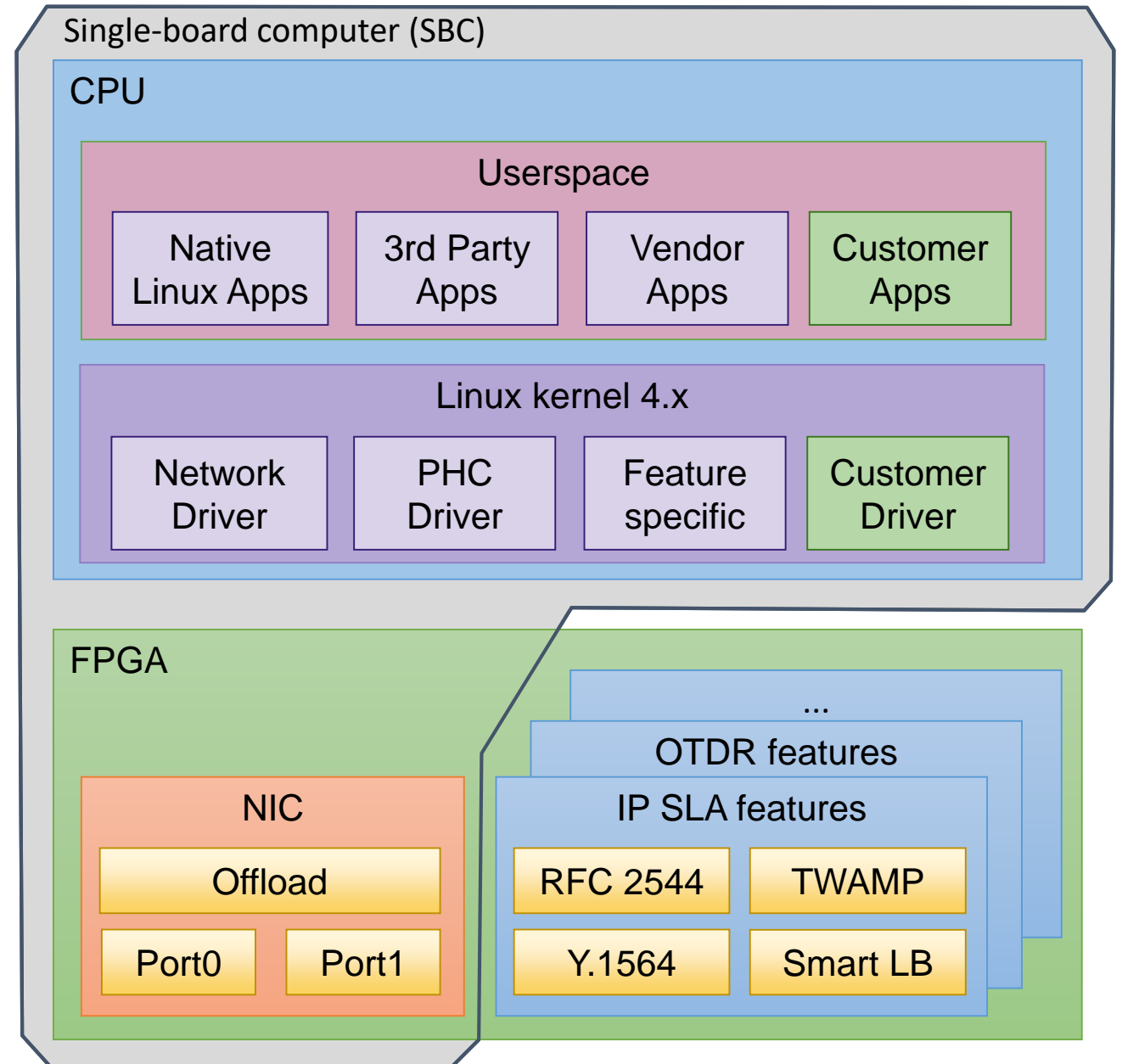
- Short Time To Market
- A lot of standard software
- A lot of network protocols support
- Management through standard utilities
- High speed of software development
- Share codebase with other projects
- Easy to integrate customer's software



Smart SFP architecture – FPGA

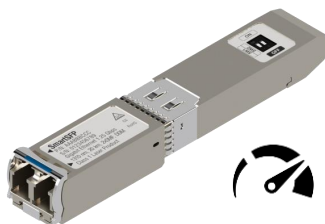
FPGA features:

- Wire-speed traffic processing
- Offload: HW timestamping, PTP HW Clock, UDP/TCP offload, switchdev
- IP SLA: traffic generator and analyzer, BW, loss, delay, jitter measurement
- Statistics: RMON, NetFlow, IPFIX
- Microburst monitoring
- Streaming telemetry
- Tunneling: MPLS, VXLAN
- OTDR
- Switching, QoS, filtering
- P4
- Encryption

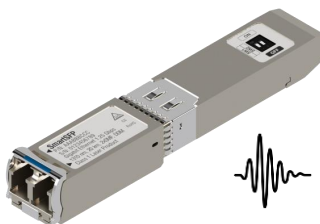


Smart SFP overview

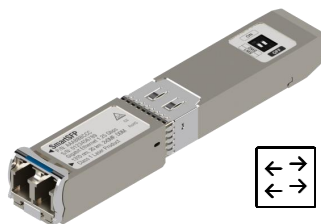
IP SLA Probe



Micro OTDR



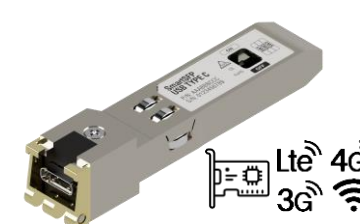
3-port Ethernet Switch



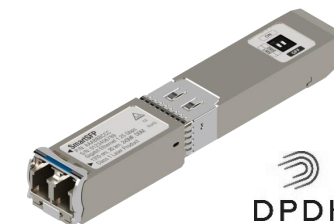
PTP / Sync-E Grandmaster



5G / 4G USB Router



Software Defined Smart SFP



Key features

- 1 Gbps packet generator and analyzer
- BW, loss, delay, jitter
- L2-L4 loopback
- TWAMP Light
- Y.1564, RFC 2544
- Loaned IP
- Packet capture
- Flow statistics by filters
- Microburst analyzer
- PTP
- HW timestamps
- 1/2 fibers or copper RJ-45
- Easy integration with 3rd party IP SLA agents

- Gigabit Ethernet SFP
- Integrated micro OTDR
- Auto/manual switching between SFP and OTDR modes
- IP management: SSH, REST API, SNMP
- I2C management
- Single or dual fiber
- Up to 40 km
- Dead zone 30 meters
- Resolution from 10 meters

- 3 port Gigabit Ethernet switch
- 2 x Single fiber independent 1 Gbps transceivers in 1 SFP case
- Tx and Rx wavelength: 1310 or 1550 nm
- VLAN/Q-in-Q, tag/untag, trunk
- Rate-limit, QoS
- BFD
- 1+1 redundancy
- Ring topology
- PRP/HSR

- Copper SFP, Gigabit Ethernet, RJ-45
- PTP grandmaster (IEEE 1588 v2), NTP, SNTP
- Sync-E
- GNSS receiver
- GPS, GLONASS
- Built-in Stratum 3 oscillator
- Antenna connector
- 1 PPS in/out

- 3G/4G/5G USB modem
- Wi-Fi access point
- Router or bridge
- Performance up to 1 Gbps
- NAT/Firewall
- VPN tunnels
- USB port type A or C

- DPDK and XDP support
- Line rate software only packet processing
- ARM CPU, 2 cores, up to 1.2 GHz
- RAM up to 1 GB
- Flash up to 4 GB
- Integrated optics
- SDK
- Open HW & SW

• SSH (CLI), RESP API, SNMP

• Remote software update

• Feature licensing mechanism

Roadmap

Hardware platform development for new linerates and interfaces

10G

10G PON

25G

