

b-plus technologies | Adrian Bertl | Strategic Product Management Software

“bRAWcap”

Light Weight Filter - Low Level Windows Network Driver

Performance for Capturing VLAN Tags, different (precise)

Time Stamp Modes (e.g. from NIC)

Test Access Point Mode

SOLUTION ARCHITECTURE IN VEHICLE DATA HARVESTING



Requirements

low mid high

Software

Visualization and Processing (Windows/Linux)

AVETO.app Developer

Recording (Windows)

AVETO.app Recorder

AVETO.dps

bRAWcap Driver (Ethernet & Windows)

Interface API (external + b-plus BMC)

XTSS Time Sync

SIODI System Management

Customer

b-plus

Interfaces

BRICKplus

BRICK2X

DATALynx ATX4

BRICKplus STORAGE / BRICK STORAGE NVMe

MDLake

Interfaces (external + b-plus BMC)

Hardware



Our tests showed, that available standard network drivers, such as NPCAP, are currently not suitable for 10G Ethernet capturing and cause the system to freeze under load.

In addition, Windows sockets only support data starting at OSI Layer 3 (IP). This means is **not possible to capture RAW data** with Windows sockets. On layer 2 Ethernet frames are PTP or gPTP TimeSync packets, MACSEC information.

In addition information such as **VLAN tags (802.1Q Header) and rx/tx timestamps are not available** via sockets (also NPCAP does not support all information), which is nevertheless interesting for measurements.

We support in “bRAWcap”

- High-performance recording on 10 Gigabit Ethernet interfaces
- Insight into **VLAN tags** and **timestamps from the Ethernet interface (Intel X550 und Intel i210)**
- In addition, in a **switchable** test access point (TAP) mode, we can both show up like a normal Ethernet interface and dump the raw frames.
- Support for all windows Ethernet devices*

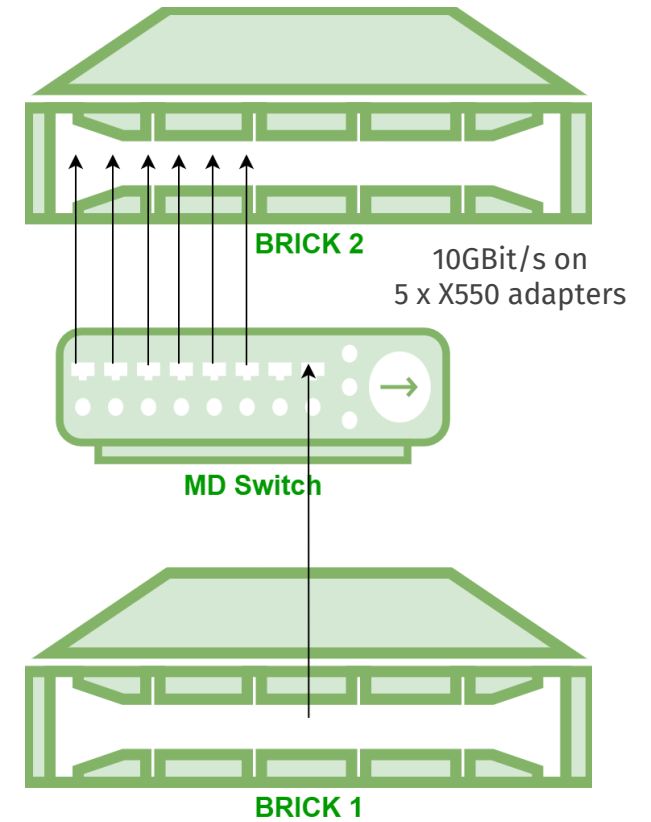
* Ethernet Devices may have limitations e.g. Timestamp Information and only a selection will be tested by b-plus



RAW RECEIVE BENCHMARKS – 10G ETHERNET EXAMPLE



10Gbit/s on 5xX550 adapters	System Idle(Only receive no further processing)	Further processing with bRAWcap	Further processing with Bppcap (XTSS 2022)	Further processing with Npcap
Version	-	BpPeter_Setup_0_0_43.exe	BPPCAP_SETUP_4.9.3.exe	npcap-1.71.exe
API Settings	-	<ul style="list-style-type: none"> Packet Buffer Size: 140.000 (Packets) Min Packet Copy: 140.000 (Packets) Receive Timeout: 900ms Indication: No 	<ul style="list-style-type: none"> Packet Buffer Size: 140.000 (Pakete) Min Packet Copy: 140.000 (Packets) Receive Timeout: 900ms 	<ul style="list-style-type: none"> Packet Buffer Size: 140.000 (Packets) Min Packet Copy: 140.000 (Packets) Receive Timeout: 900ms
Windows performance monitoring (about 10 minutes)	idle_10gbits.blg	bppeteter_10gbits.blg	bppcap_10gbits.blg	npcap_10gbits.blg
I/O throughput (average)		5,11 GByte/s	4,61 GByte/s	1,64 GByte/s
		(110% of Bppcap) 310%	281%	100%
CPU Info (average)	Load: 11,28% <ul style="list-style-type: none"> DPC: 10,11% User: 00,26% Rest: 00,91% 	Load: 27,48% (+16,20%) <ul style="list-style-type: none"> DPC: 23,81% (+13,70%) User: 00,82% (+00,55%) Rest: 02,85% (+01,94%) 	Load: 34,51% (+23,23%) <ul style="list-style-type: none"> DPC: 25,38% (+15,27%) User: 00,47% (+00,21%) Rest: 08,66% (+07,75%) 	Load: 37,38% (+26,10%) <ul style="list-style-type: none"> DPC: 27,39% (+17,28%) User: 00,34% (+00,08%) Rest: 9,65% (+08,74%)
	Free: 85,26%	Free: 72,52%	Free: 64,09%	Free: 62,17%
		Receive performance cost: 12,74%	Receive performance cost: 21,17%	Receive performance cost: 23,09%



Demo Limitations:

- The Demo has full functionality but is **limited to 5 minutes operation** then receive is suspended for 10 minutes.
- Adapter handling is limited to **scanning the target for supported adapters**. Event notification and translation of additional adapter properties require a licensed version.

Generic

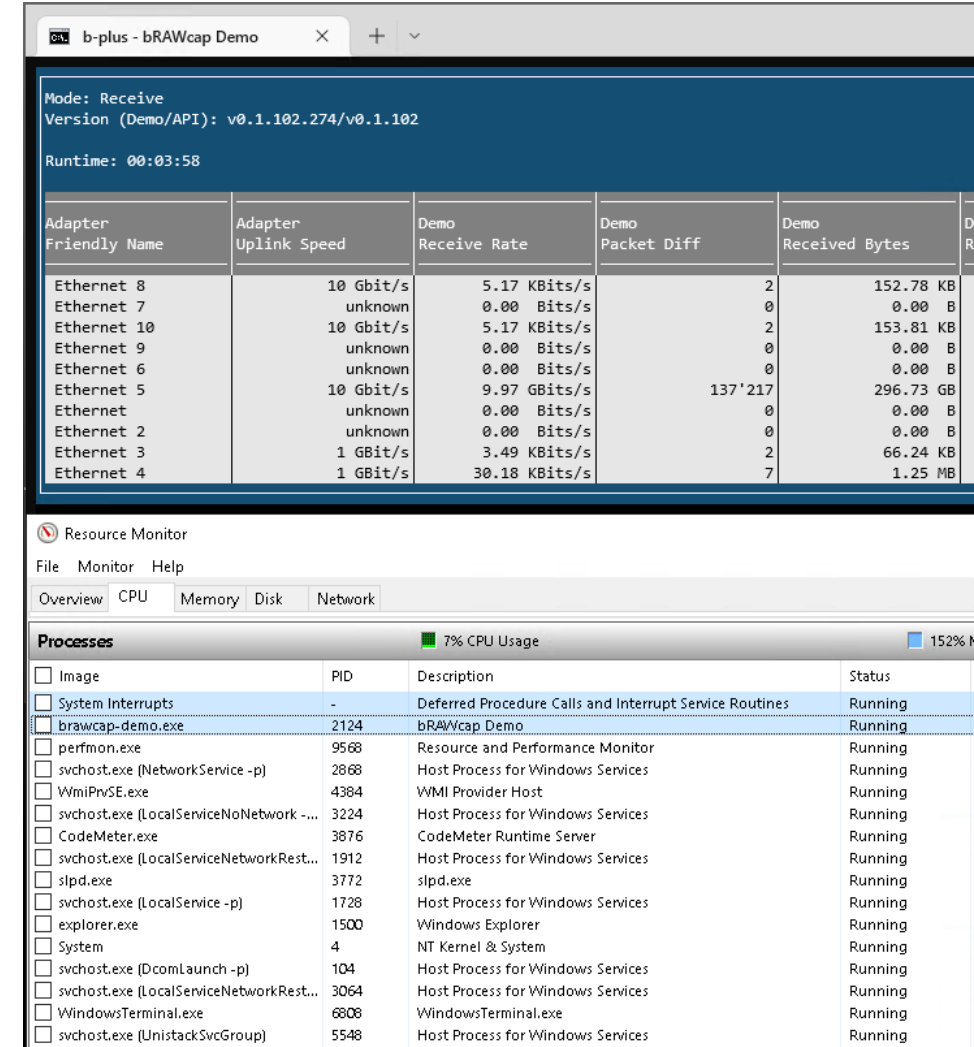
- Configurable (detailed) file logging, which allows to select log levels for different (sub)parts.
- Support of several concurrent bRAWcap handles to the same adapter.

Adapter

- Possibility to scan the target for supported adapters.
- Translation between several adapter information (GUID, MAC, Description, FriendlyName).
- Reading current adapter properties/states (Speed Rx/Tx, MTU, IPv4/6, Operation, Connection).
- Event notification on adapter changes.

Monitoring

- Multiple receive packet drop counters, for different drop reasons and locations.
- Multiple receive packet counters, for different locations e.g. at NIC level, driver before/after filtering.
- Receive packet counters, for user space exchange.



The screenshot shows the b-plus - bRAWcap Demo application window. The top section displays the mode (Receive), version (v0.1.102.274/v0.1.102), and runtime (00:03:58). Below this is a table with network statistics:

Adapter Friendly Name	Adapter Uplink Speed	Demo Receive Rate	Demo Packet Diff	Demo Received Bytes
Ethernet 8	10 Gbit/s	5.17 KBits/s	2	152.78 KB
Ethernet 7	unknown	0.00 Bits/s	0	0.00 B
Ethernet 10	10 Gbit/s	5.17 KBits/s	2	153.81 KB
Ethernet 9	unknown	0.00 Bits/s	0	0.00 B
Ethernet 6	unknown	0.00 Bits/s	0	0.00 B
Ethernet 5	10 Gbit/s	9.97 GBits/s	137'217	296.73 GB
Ethernet	unknown	0.00 Bits/s	0	0.00 B
Ethernet 2	unknown	0.00 Bits/s	0	0.00 B
Ethernet 3	1 GBit/s	3.49 KBits/s	2	66.24 KB
Ethernet 4	1 GBit/s	30.18 KBits/s	7	1.25 MB

Below the table is the Windows Resource Monitor window, showing the Processes tab. The brawcap-demo.exe process is highlighted, showing it is running with 7% CPU usage. Other running processes include System Interrupts, perfmon.exe, svchost.exe (NetworkService -p), WmiPrvSE.exe, svchost.exe (LocalServiceNoNetwork -...), CodeMeter.exe, svchost.exe (LocalServiceNetworkRest...), slpd.exe, svchost.exe (LocalService -p), explorer.exe, System, svchost.exe (DcomLaunch -p), svchost.exe (LocalServiceNetworkRest...), WindowsTerminal.exe, and svchost.exe (UnistackSvcGroup).

BRAWCAP DEMO APPLICATION 10GBIT RECEIVE



b-plus - bRAWcap Demo

Mode: Receive
Version (Demo/API): v0.1.102.274/v0.1.102
Runtime: 00:03:58

Adapter Friendly Name	Adapter Uplink Speed	Demo Receive Rate	Demo Packet Diff	Demo Received Bytes	Driver Received Packets	Driver Filtered Packets	Driver Dropped Packets
Ethernet 8	10 Gbit/s	5.17 KBits/s	2	152.78 KB	748	736	0
Ethernet 7	unknown	0.00 Bits/s	0	0.00 B	0	0	0
Ethernet 10	10 Gbit/s	5.17 KBits/s	2	153.81 KB	747	744	0
Ethernet 9	unknown	0.00 Bits/s	0	0.00 B	0	0	0
Ethernet 6	unknown	0.00 Bits/s	0	0.00 B	0	0	0
Ethernet 5	10 Gbit/s	9.97 GBits/s	137'217	296.73 GB	32'890'673	32'873'375	0
Ethernet	unknown	0.00 Bits/s	0	0.00 B	0	0	0
Ethernet 2	unknown	0.00 Bits/s	0	0.00 B	0	0	0
Ethernet 3	1 GBit/s	3.49 KBits/s	2	66.24 KB	326	325	0
Ethernet 4	1 GBit/s	30.18 KBits/s	7	1.25 MB	3'592	3'079	0

Resource Monitor

File Monitor Help

Overview CPU Memory Disk Network

Processes ■ 7% CPU Usage ■ 152% Maximum Frequency

Image	PID	Description	Status	Threads	CPU	Average CPU
System Interrupts	-	Deferred Procedure Calls and Interrupt Service Routines	Running	-	1	1.09
brawcap-demo.exe	2124	bRAWcap Demo	Running	46	0	0.39
perfmom.exe	9568	Resource and Performance Monitor	Running	17	0	0.19
svchost.exe (NetworkService -p)	2868	Host Process for Windows Services	Running	12	0	0.11
WmiPrvSE.exe	4384	WMI Provider Host	Running	7	0	0.10
svchost.exe (LocalServiceNoNetwork -...)	3224	Host Process for Windows Services	Running	18	0	0.07
CodeMeter.exe	3876	CodeMeter Runtime Server	Running	19	0	0.05
svchost.exe (LocalServiceNetworkRest...)	1912	Host Process for Windows Services	Running	8	0	0.04
slpd.exe	3772	slpd.exe	Running	6	0	0.03
svchost.exe (LocalService -p)	1728	Host Process for Windows Services	Running	11	0	0.03
explorer.exe	1500	Windows Explorer	Running	58	0	0.01
System	4	NT Kernel & System	Running	206	0	0.01
svchost.exe (DcomLaunch -p)	104	Host Process for Windows Services	Running	11	0	0.01
svchost.exe (LocalServiceNetworkRest...)	3064	Host Process for Windows Services	Running	3	0	0.01
WindowsTerminal.exe	6808	WindowsTerminal.exe	Running	11	0	0.01
svchost.exe (UnistackSvcGroup)	5548	Host Process for Windows Services	Running	6	0	0.01

Views

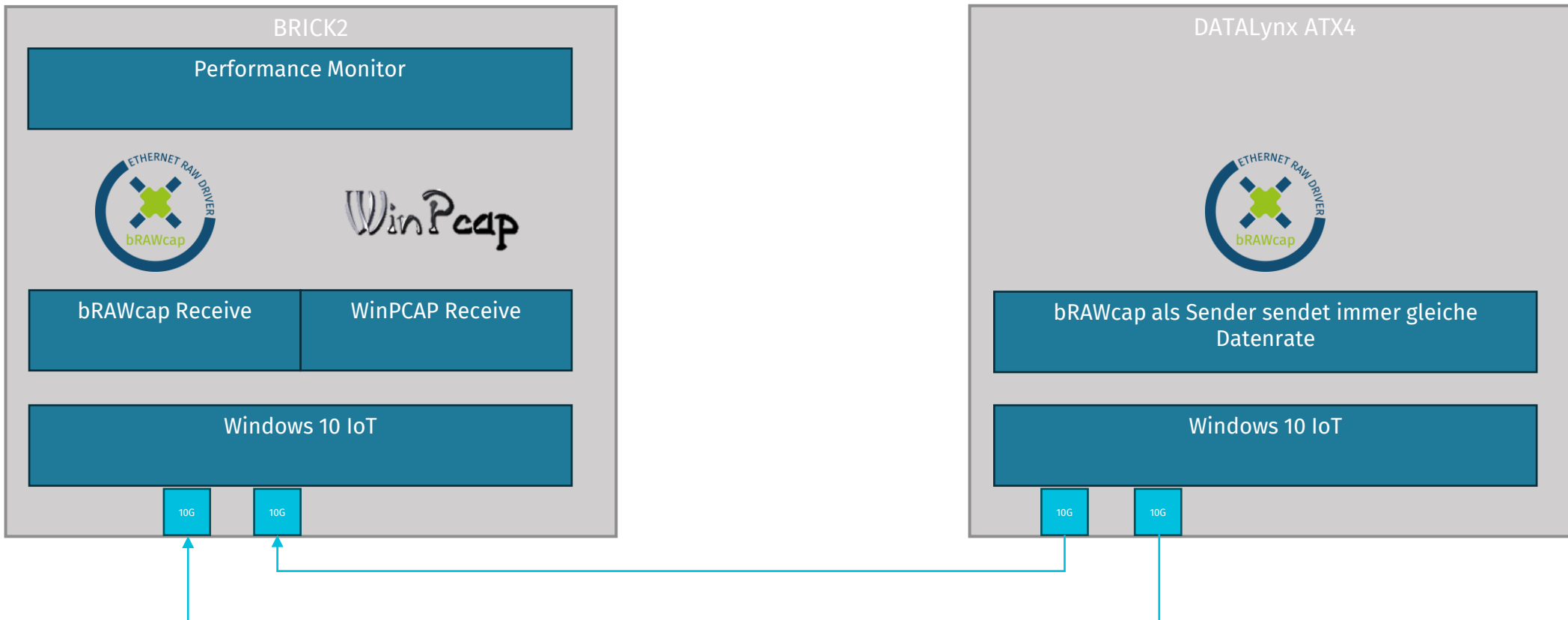
CPU - Total 100%

60 Seconds 0%

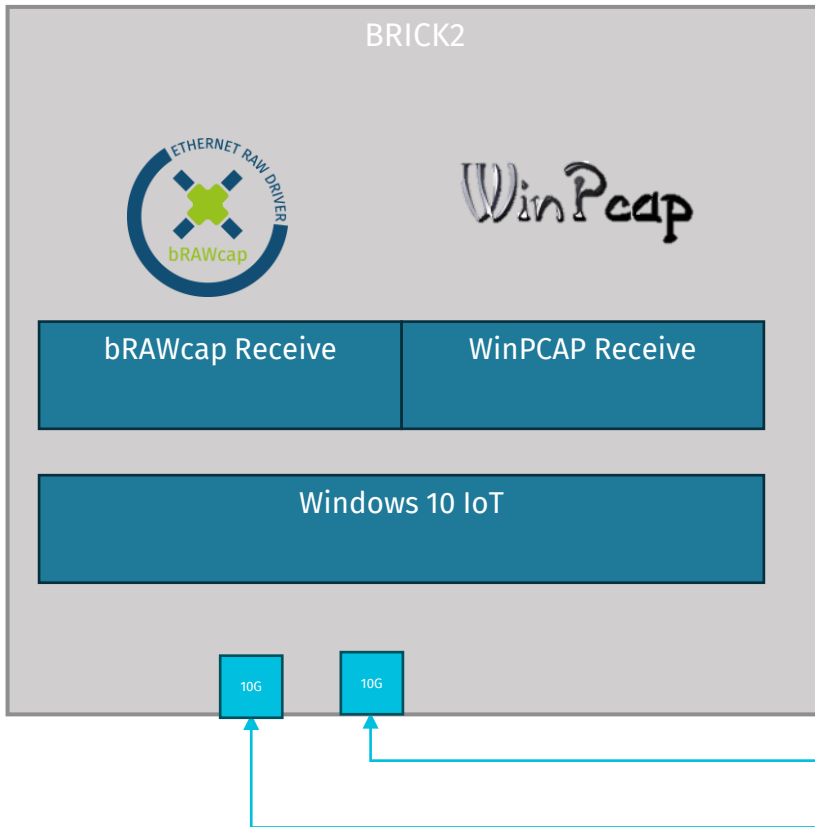
Service CPU Usage 100%

CPU 0

Die Messe Demo zeigt den Vergleich beim Empfangen von Datenpaketen von **bRAWcap** zu **WinPCAP**.



Die Messe Demo zeigt den Vergleich beim Empfangen von Datenpaketen von bRAWcap zu WinPCAP.



Messwerte

CPU Utilization beim Empfangen
Messung
IO Durchsatz in den User Space

- Die Ergebnisse zeigen:
- bRAWcap hat eine gleiche CPU Auslastung wie WinPCAP
 - bRAWcap verliert keine Pakete
 - WinPCAP jedoch verliert die Pakete und kann nicht alle empfangen
 - bRAWcap bekommt netto mehr Pakete in den User Space bei gleicher Auslastung

Demo starten:
DATAlynx ATX4

