

# Detaillierte Ergebnispräsentation der durchgeführten Firewall-Lasttests

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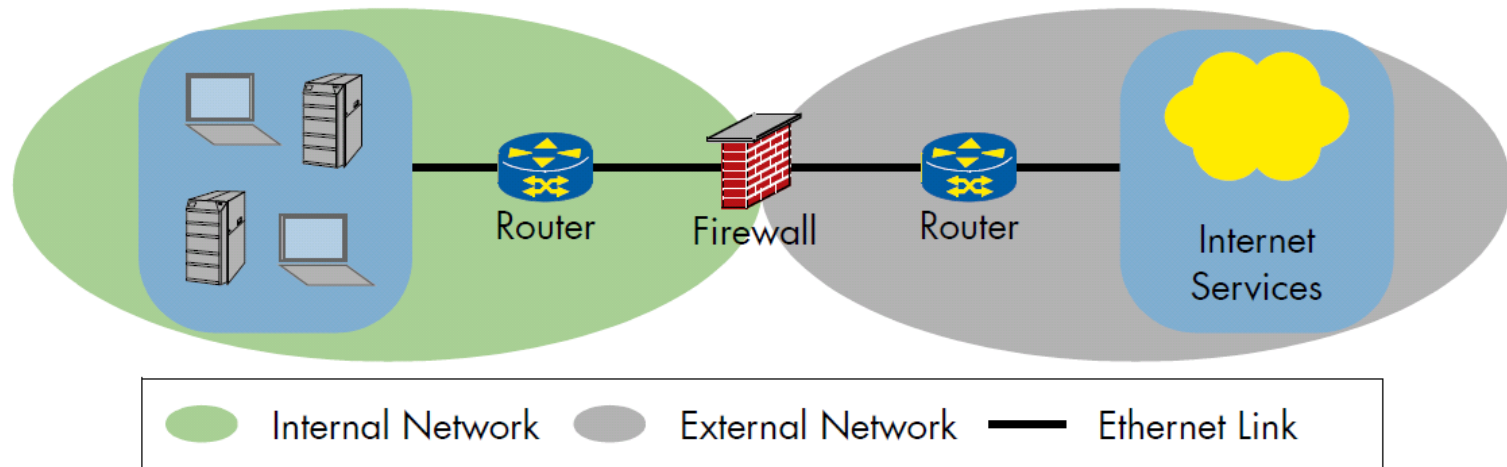
# Agenda

- Test Setup
- Erwartungen
- Vorstellung der Devices Under Tests
- Ergebnisse

# Firewall Lasttests

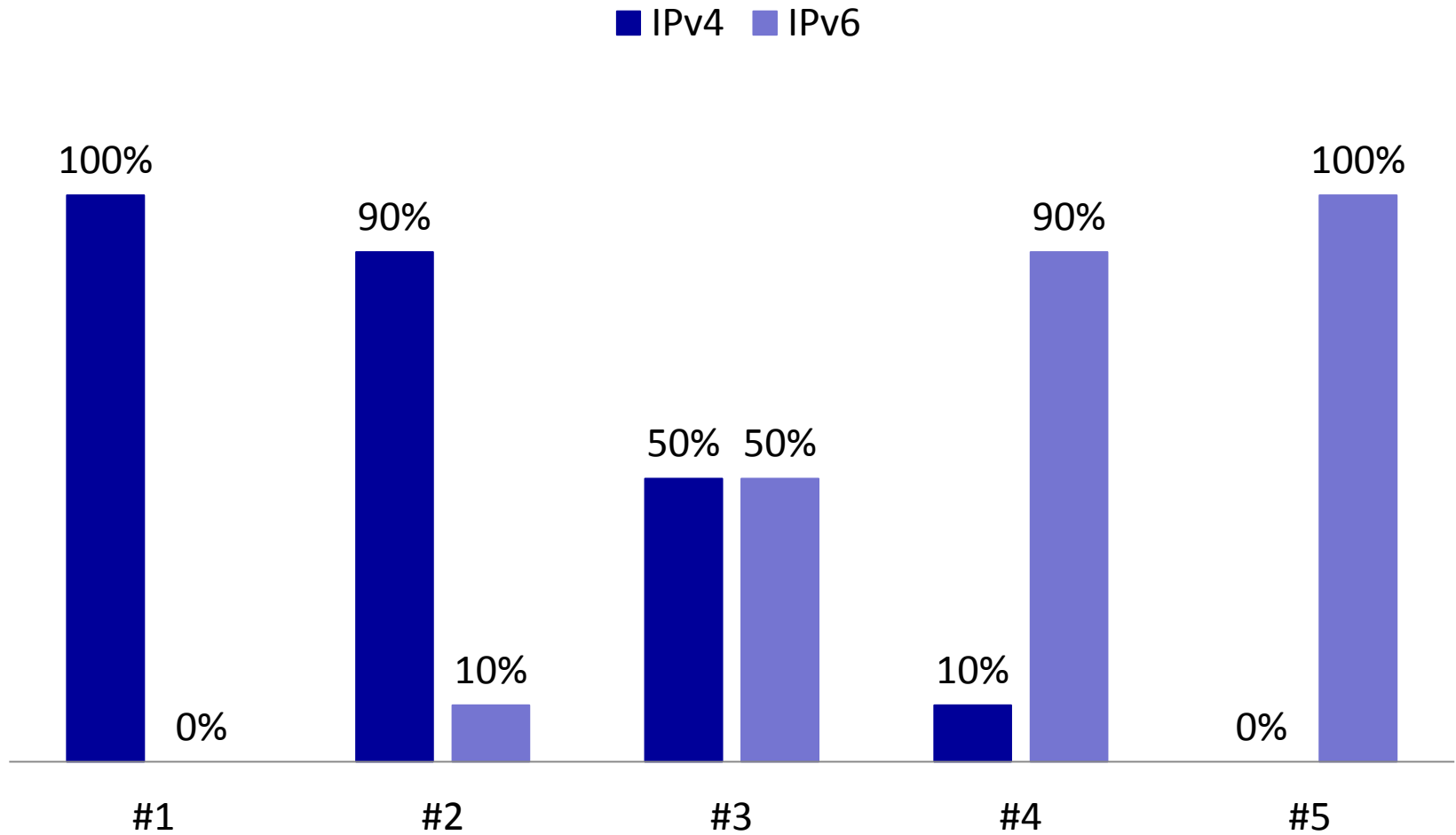
## Test Setup

- Filter basiert auf IETF RFCs 2544 und 5180
  - 25 IPv4 “drop” rules
  - 25 IPv6 “drop” rules
- Router



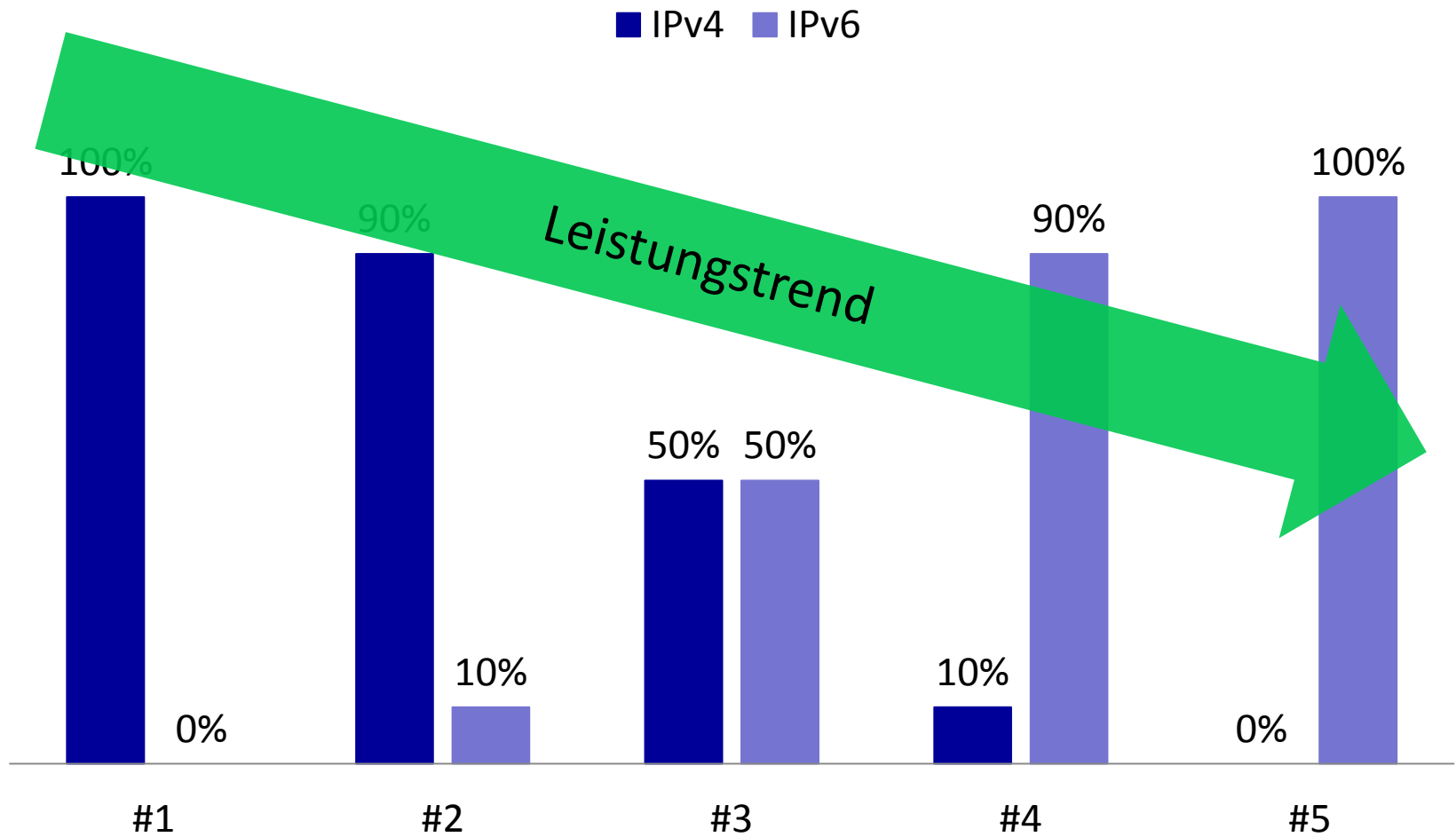
# Coexistence Traffic Ratios

## Erwartungen



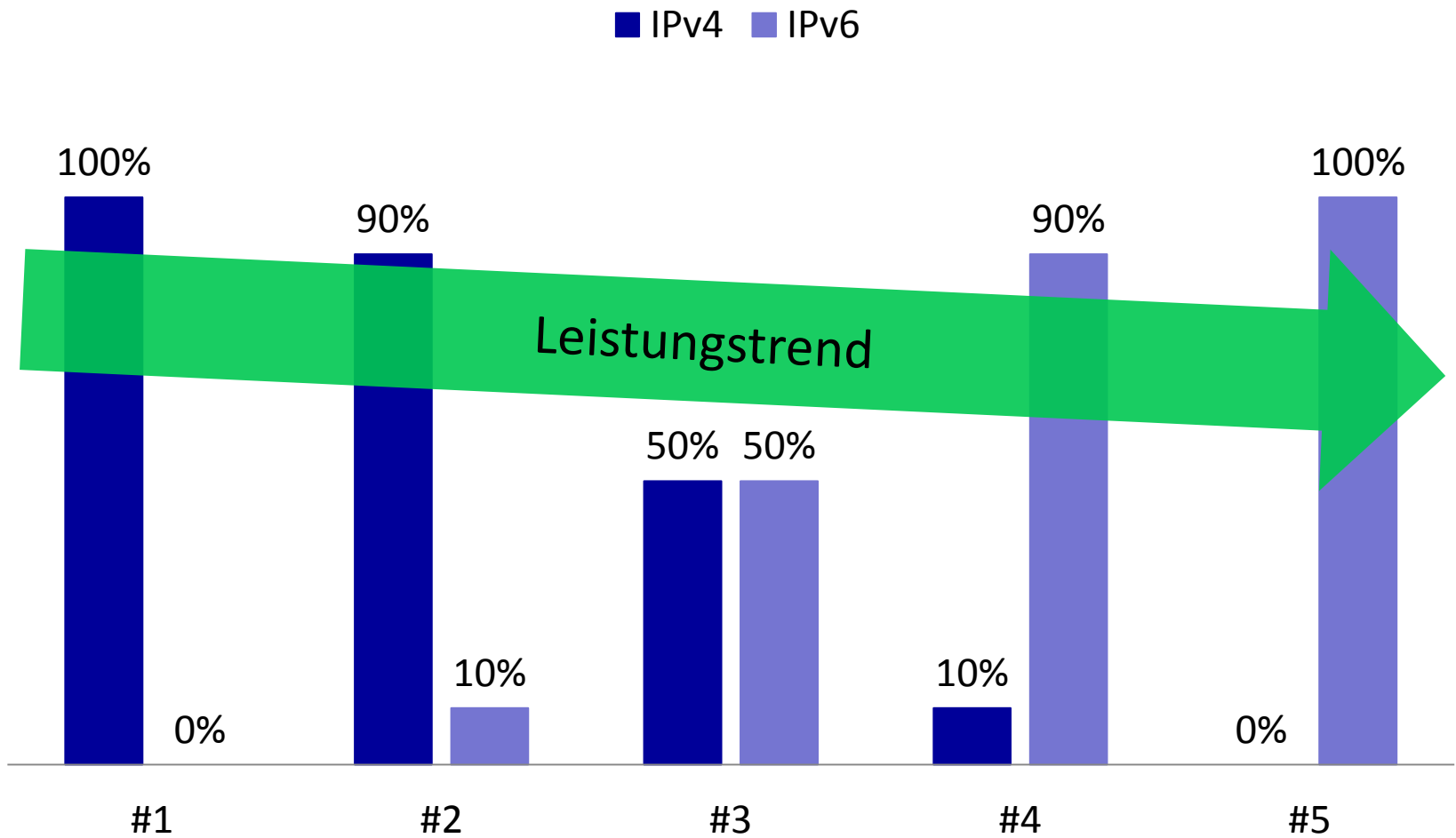
# Coexistence Traffic Ratios

## Starke Auswirkung von IPv6



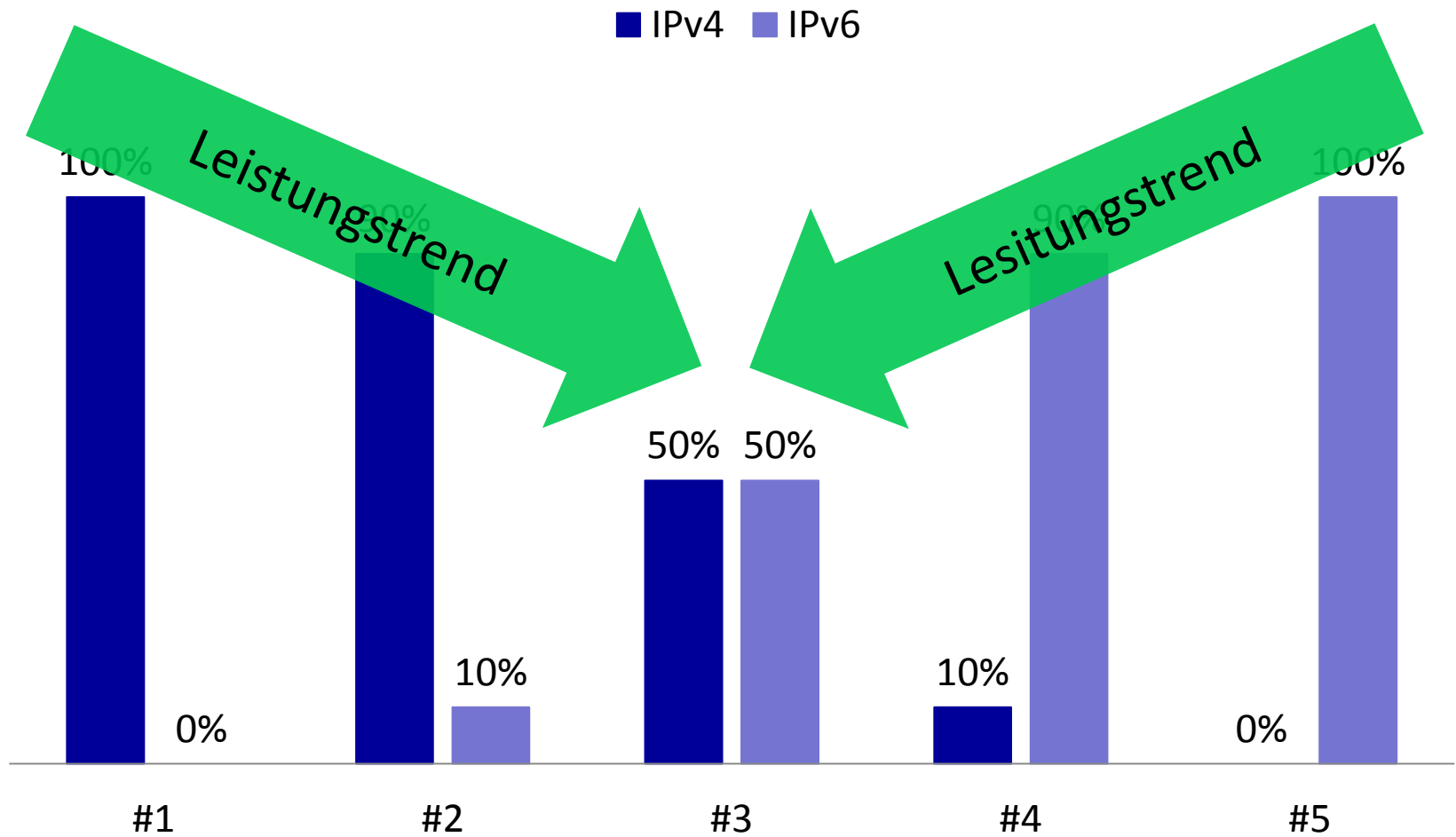
# Coexistence Traffic Ratios

## Leichte Auswirkung von IPv6



# Coexistence Traffic Ratios

## Dual-Stack Auswirkung



# Device Under Test (#1)

## Checkpoint Firewall CP2210



Software Version  
R75.10

## TECHNICAL SPECIFICATIONS

### Base Configuration

6 x 10/100/1000Base-T RJ45 ports

250 GB hard disk drive

External AC to DC power adaptor

### Performance

114 SecurityPower<sup>1</sup>

3 Gbps of firewall throughput, 1518 byte UDP

400 Mbps of VPN throughput, AES-128

2 Gbps of IPS throughput Default IPS profile

300 Mbps of IPS throughput Recommended IPS profile

1.2 million concurrent connections

25,000 connections per second

### Network Connectivity

1024 VLANs

256 VLANs per interface

802.3ad passive and active link aggregation

Layer 2 (transparent) and Layer 3 (routing) mode



# Device Under Test (#2)

Juniper J2320  
Service Router



(1GB DRAM Model)

Software Version  
10.2R3.10

| Specification                               | J2320             |
|---|-------------------|
| <b>Maximum Performance and Capacity</b>     |                   |
| Junos OS version tested                     | Junos OS 11.4     |
| Firewall performance (large packets)        | 600 Mbps          |
| Firewall performance (IMIX)                 | 400 Mbps          |
| Firewall + routing PPS (64 Byte)            | 150 Kpps          |
| AES256+SHA-1/3DES+SHA-1 VPN performance     | 125 Mbps          |
| IPsec VPN Tunnels                           | 1 GB DRAM / 512   |
| IPS (Intrusion prevention system)           | 115 Mbps          |
| Antivirus                                   | 25 Mbps           |
| Connections per second                      | 5,000             |
| Maximum concurrent sessions<br>DRAM options | 128 K, 1 GB DRAM  |
| Maximum security policies                   | 2,048 (1 GB DRAM) |
| Maximum users supported                     | Unrestricted      |

# Layer 3 Performance Test

## Vorstufe: 100% IPv4

- Baseline ermitteln

Maximaler, verlustfreier Layer 3 Durchsatz

- IMIX (Internet Mix)

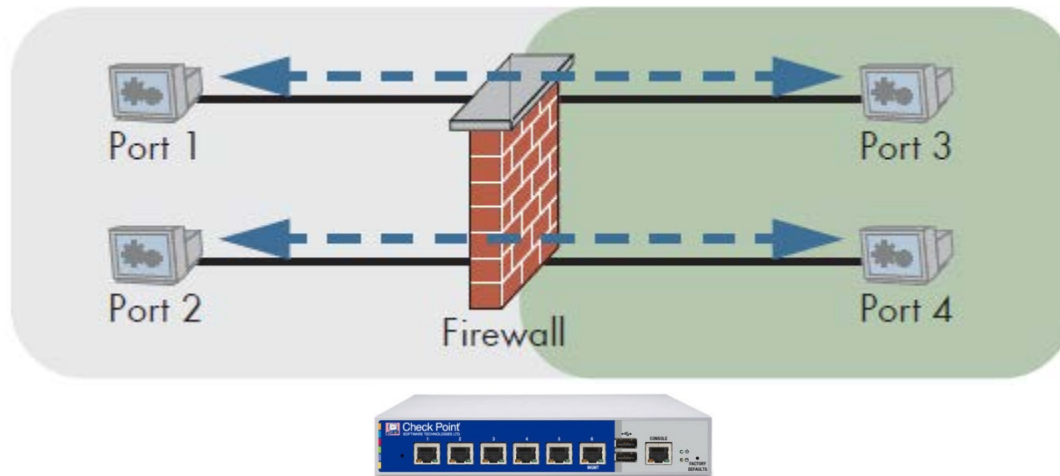
basiert auf Paketgrößen aus RFC 5180

| Größe (Bytes)        | Gewicht            |
|----------------------|--------------------|
| 130                  | 2                  |
| 256                  | 1                  |
| 512                  | 1                  |
| 1024                 | 1                  |
| 1280                 | 1                  |
| 1518                 | 1                  |
| <b>Durchschnitt:</b> | <b>674.3 Bytes</b> |

# Vorstufe: Checkpoint CP2210

## Messung nach den Herstellerangaben (1/2)

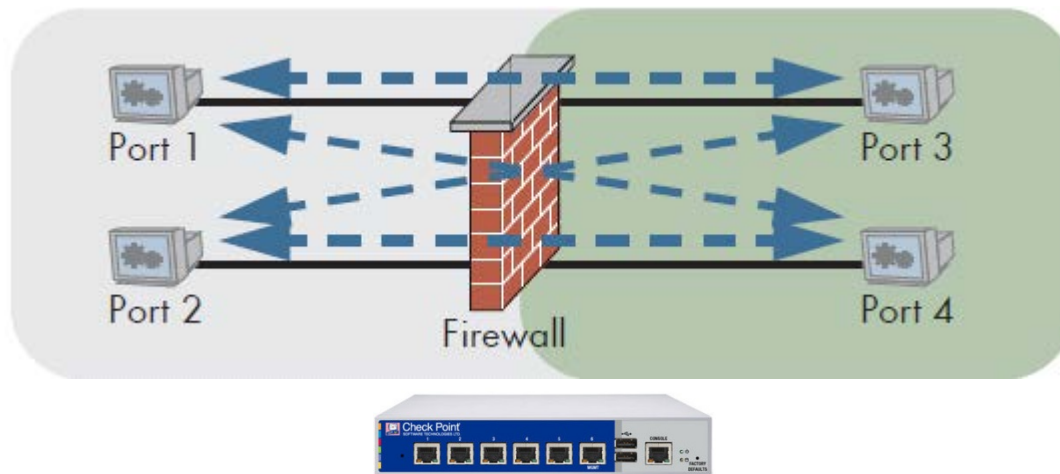
- 5 Ports + 1 Management-Port  
4 wurden eingesetzt
- Herstellerangabe: 3 Gbit/s bei UDP, 1518 Bytes.  
EANTC Ergebnis (portweise):  
3 Gbit/s bei UDP, 1518 Bytes



# Vorstufe: Checkpoint CP2210

## Messung nach den Herstellerangaben (2/2)

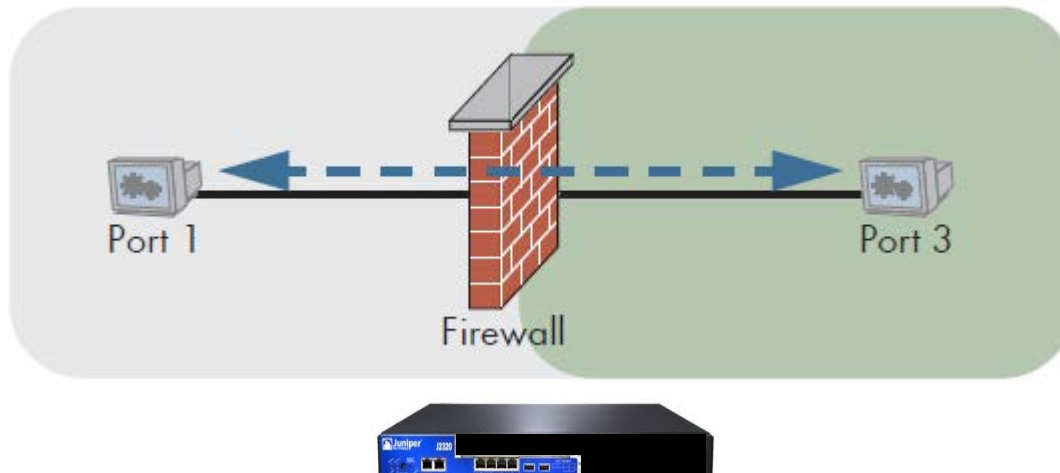
- Partial-Meshing (UDP, 1518 Bytes)  
EANTC Ergebnis:**2.7 Gbit/s.**
- Bei IMIX (statt 1518 Bytes):  
EANTC Ergebnis:**1.3 Gbit/s.**



# Vorstufe: Juniper J2320

## Messung nach den Herstellerangaben

- 3 Ports + 1 Management-Port  
2 wurden eingesetzt
- Herstellerangabe:  
600 Mbit/s for “Large Packets”  
400 Mbit with IMIX
- EANTC Ergebnisse:  
640 Mbit/s (bei **IMIX**)



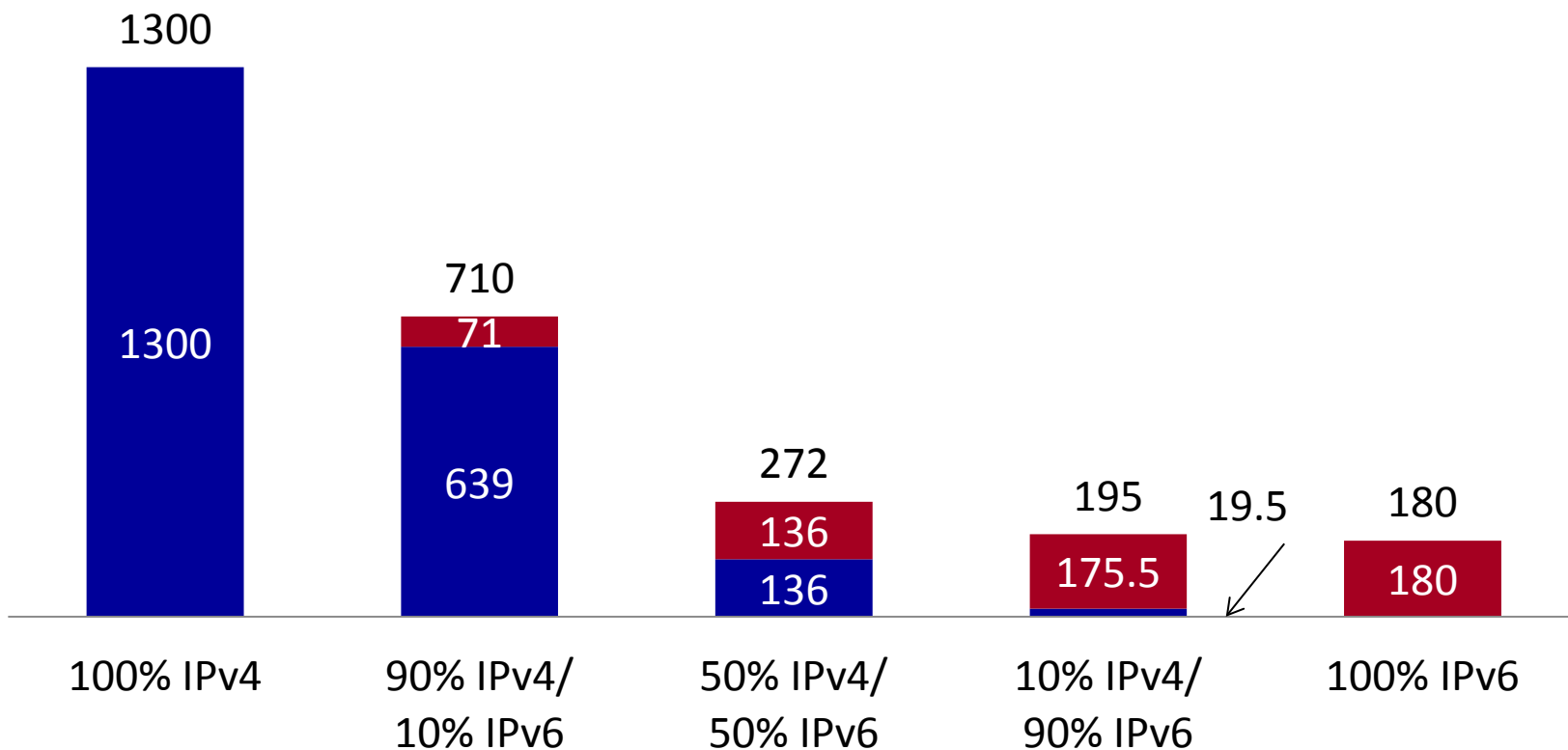
# Layer 3 Throughput [Mbit/s]

## Checkpoint CP2210



### Throughput [Mbit/s]

■ IPv4 ■ IPv6



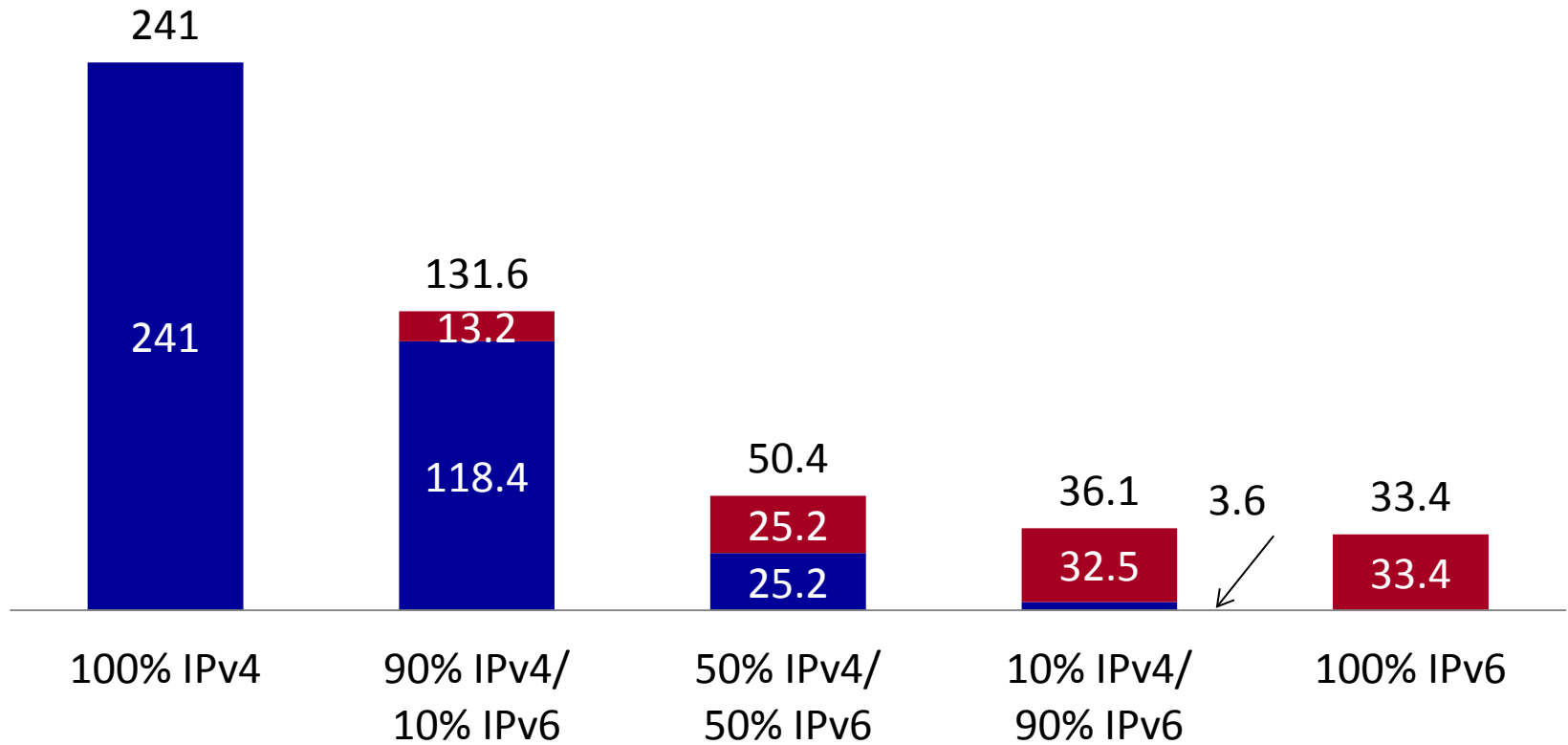
# Layer 3 Throughput [kPackets/sec]

## Checkpoint CP2210



### Throughput [kPackets/sec]

■ IPv4 ■ IPv6



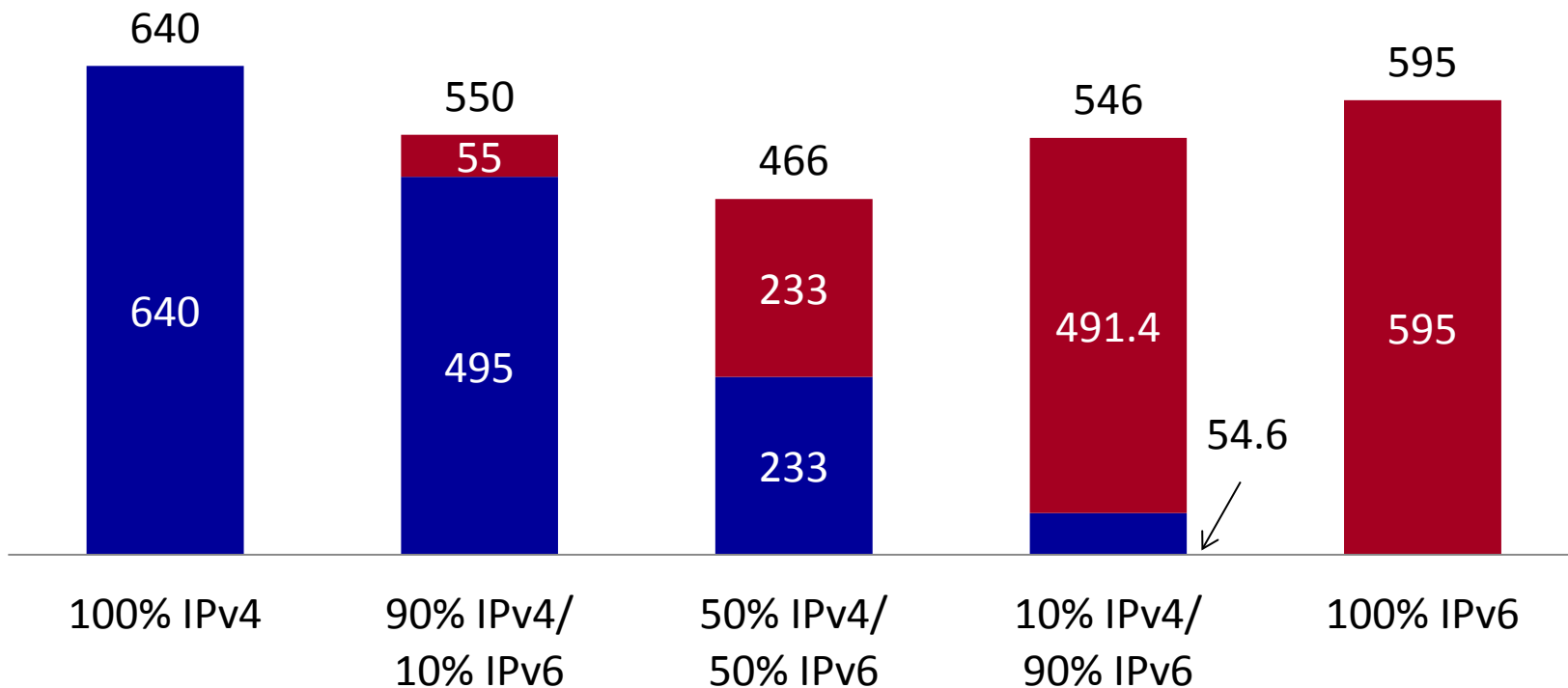
# Layer 3 Throughput [Mbit/s]

## Juniper J2320



### Throughput [Mbit/s]

■ IPv4 ■ IPv6



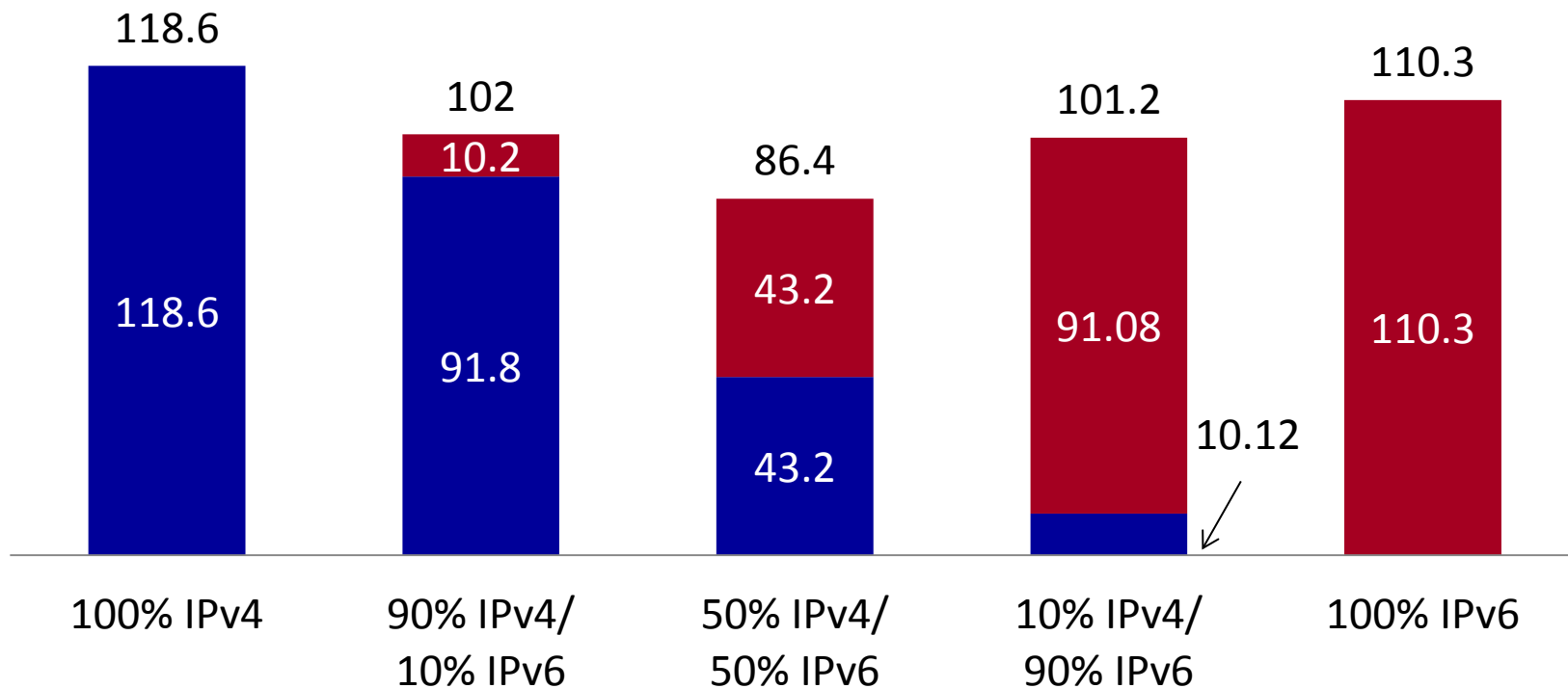


# Layer 3 Throughput [kPackets/sec] Juniper J2320



## Throughput [kPackets/s]

■ IPv4 ■ IPv6



# Connection Setup Rate

## Checkpoint CP2210

- Gemessene Rate wesentlich niedriger als Herstellersangabe.

### Performance

114 SecurityPower<sup>1</sup>

3 Gbps of firewall throughput, 1518 byte UDP

400 Mbps of VPN throughput, AES-128

2 Gbps of IPS throughput Default IPS profile

300 Mbps of IPS throughput Recommended IPS profile

1.2 million concurrent connections

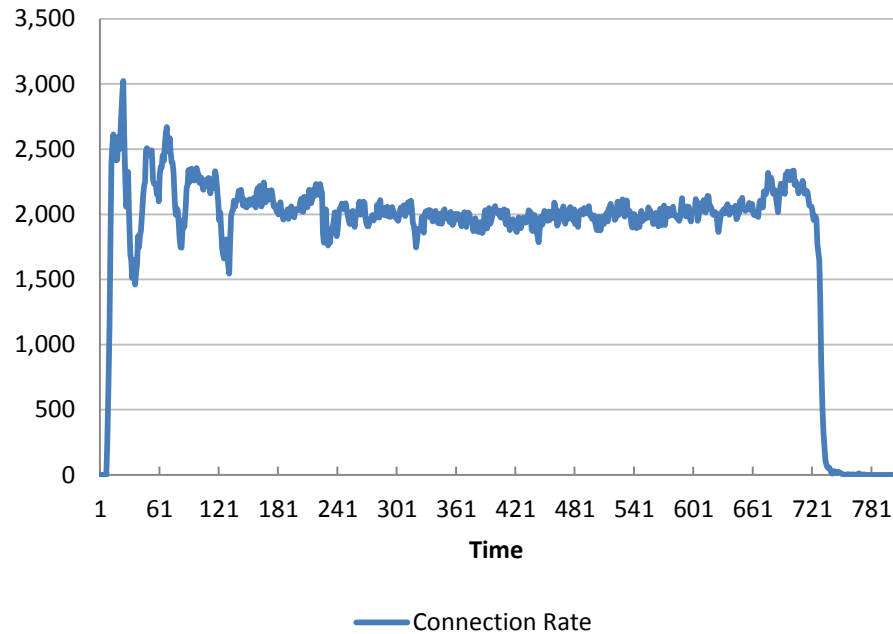
25,000 connections per second

- Grund: Ausschaltung eines Beschleunigungsfeatures wegen IPv6-Adressen.

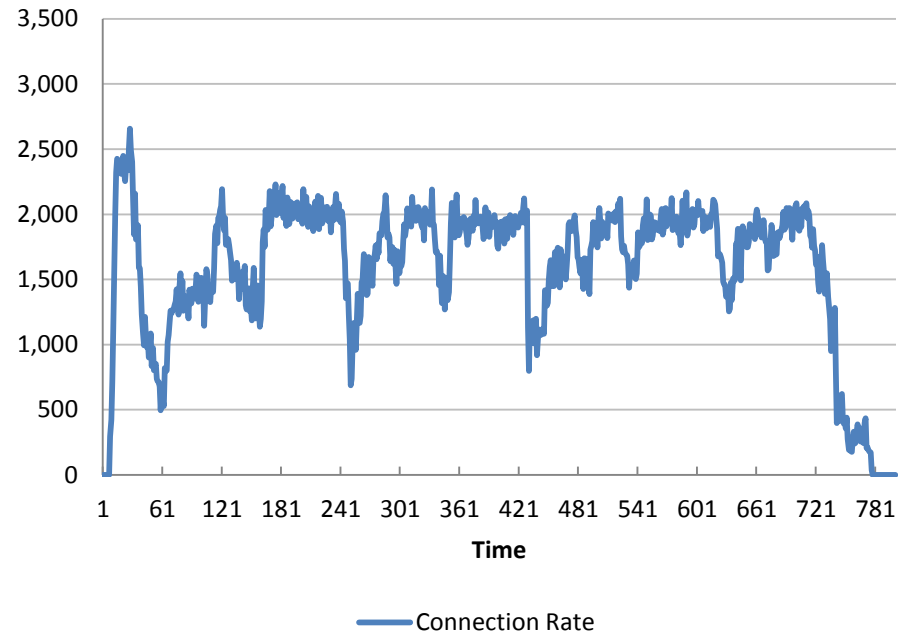
# Connection Setup Rate Checkpoint CP2210 (Results)



### 90% IPv6, 10% IPv4

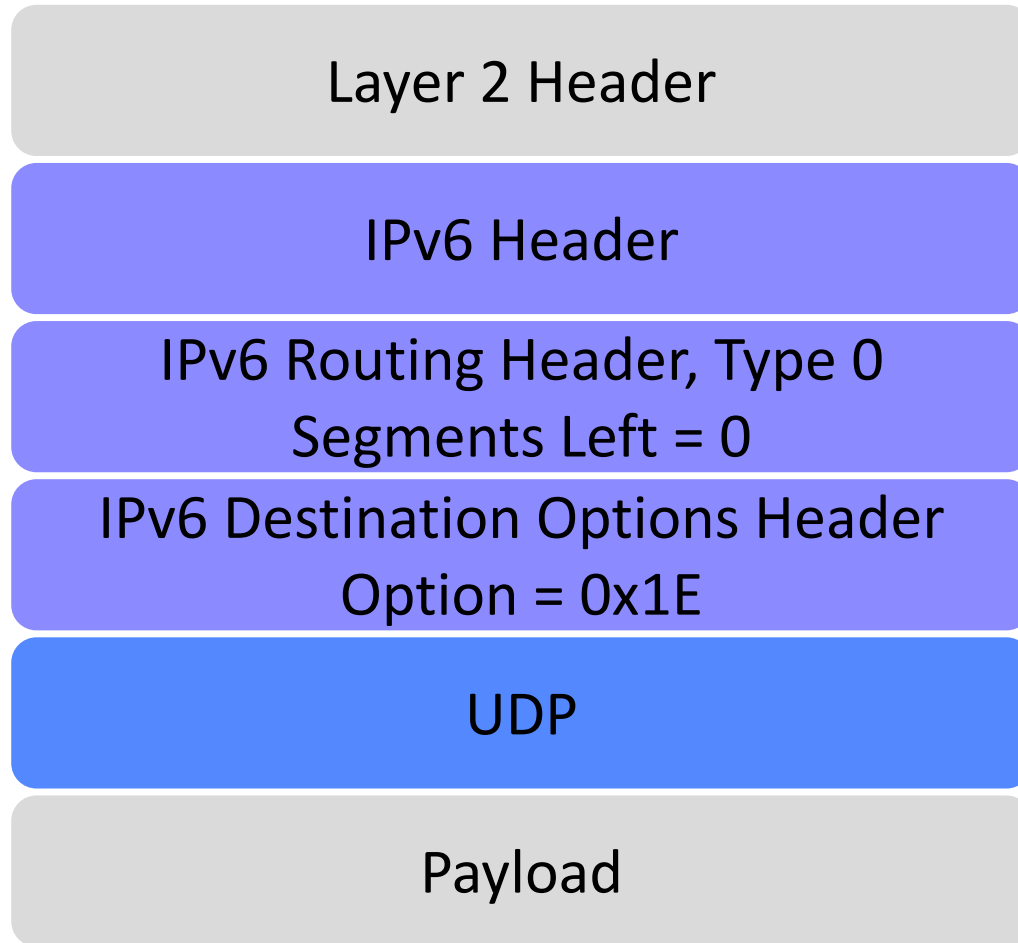


### 100% IPv6



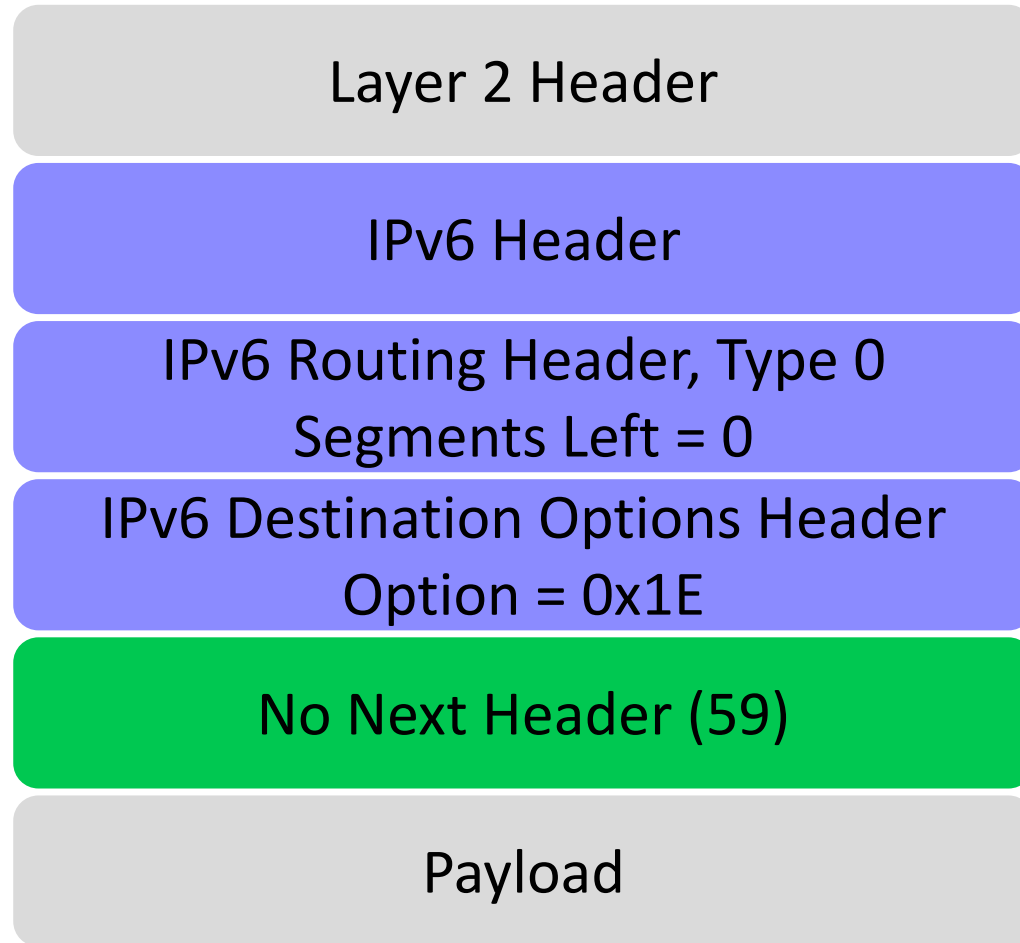
# Layer 3 Throughput with Extension Headers

## Header Layout (1/2)



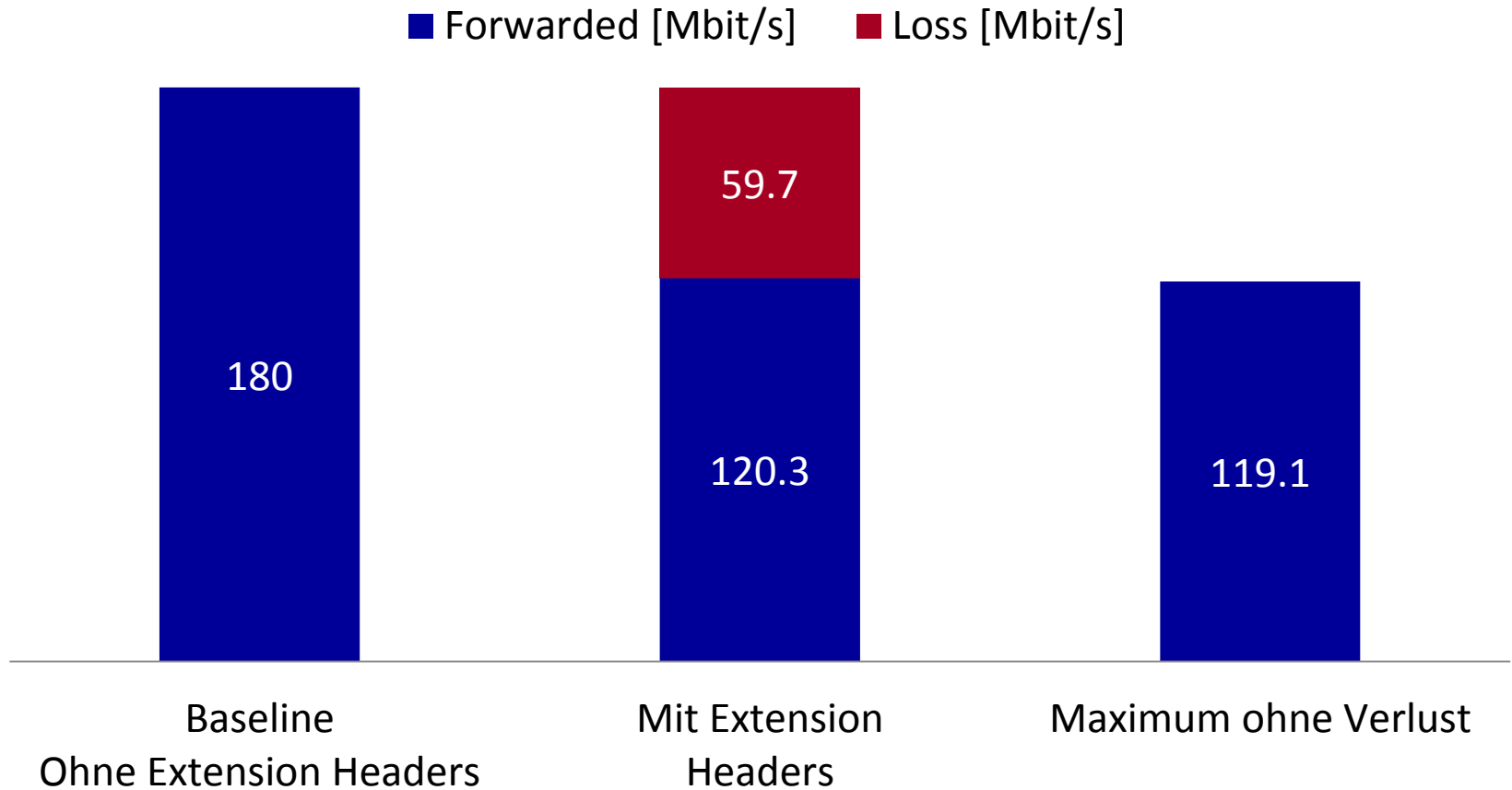
# Layer 3 Throughput with Extension Headers

## Header Layout (2/2)



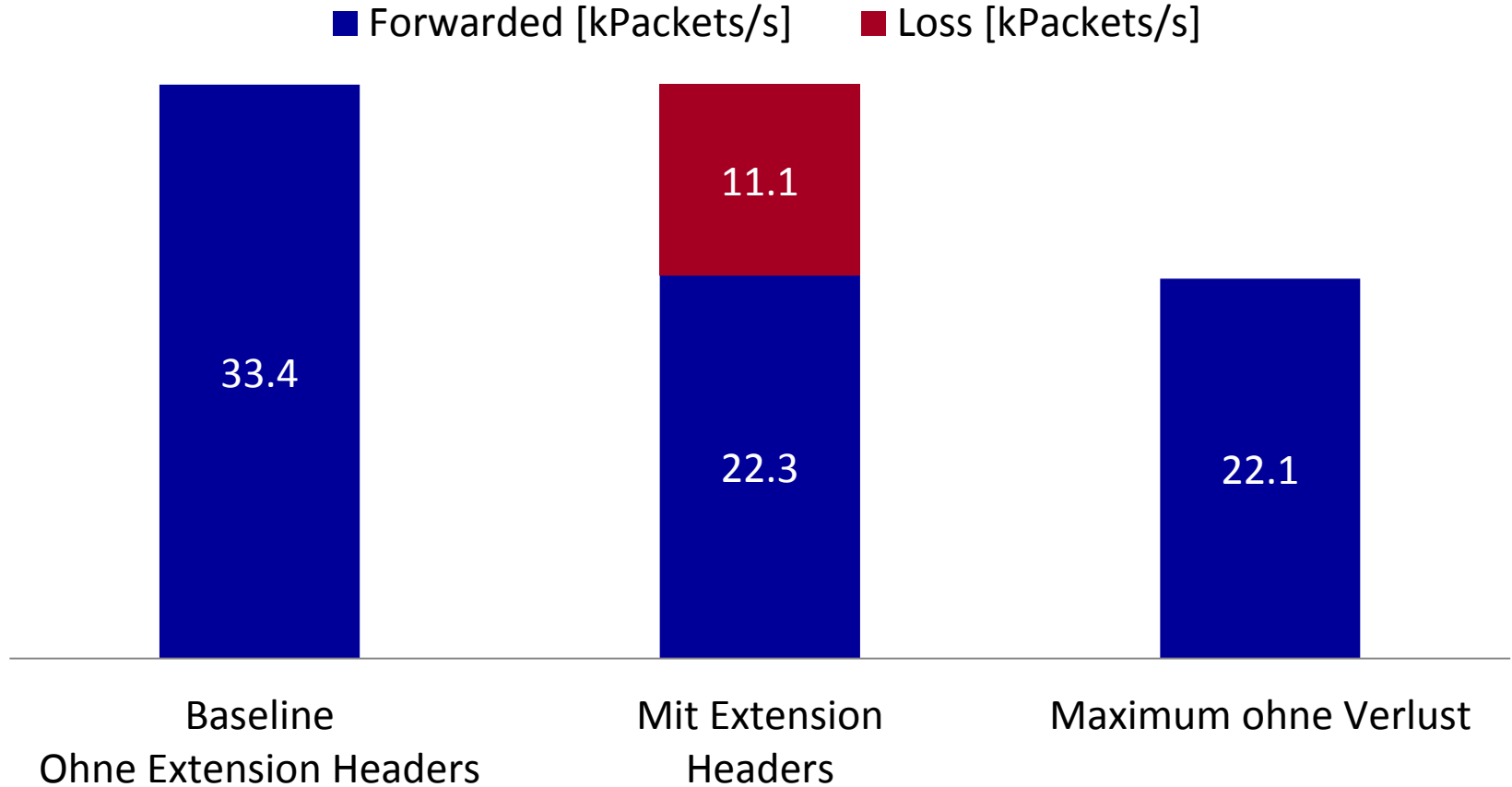
# Layer 3 Throughput with Extension Headers

## Checkpoint CP2210 [Mbit/sec]



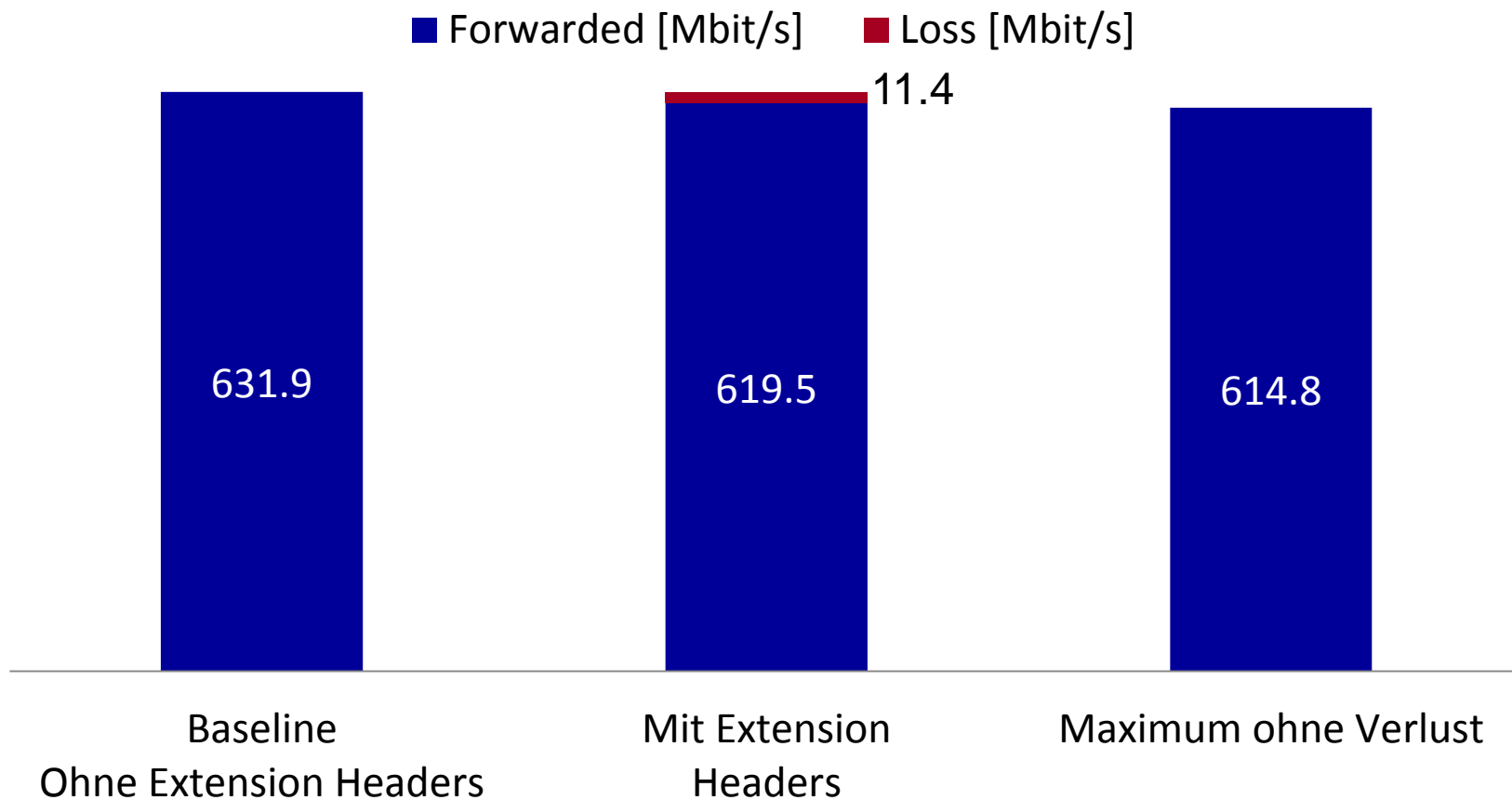
# Layer 3 Throughput with Extension Headers

## Checkpoint CP2210 [kPackets/sec]



# Layer 3 Throughput with Extension Headers

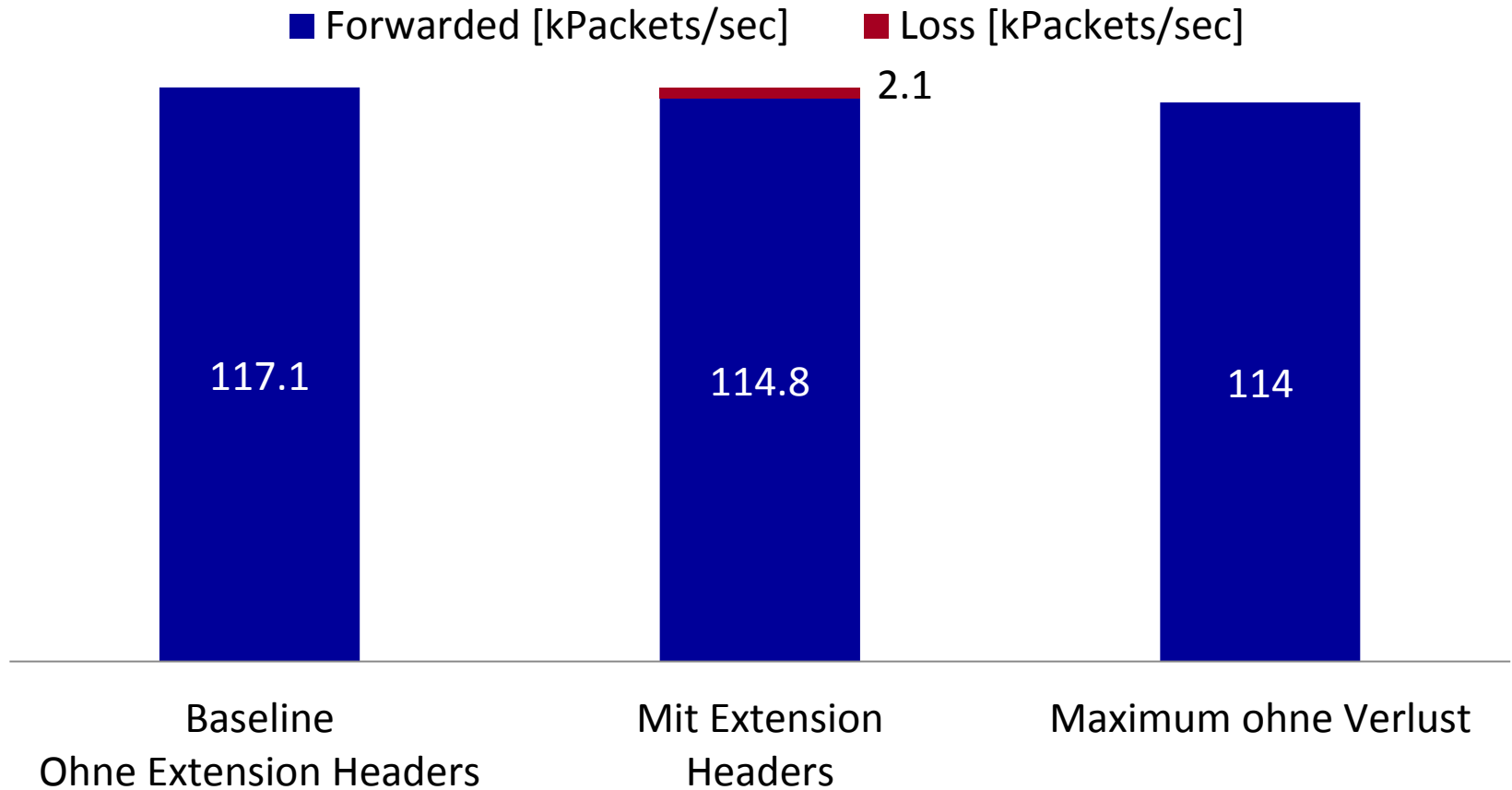
## Juniper J2320 [Mbit/sec]





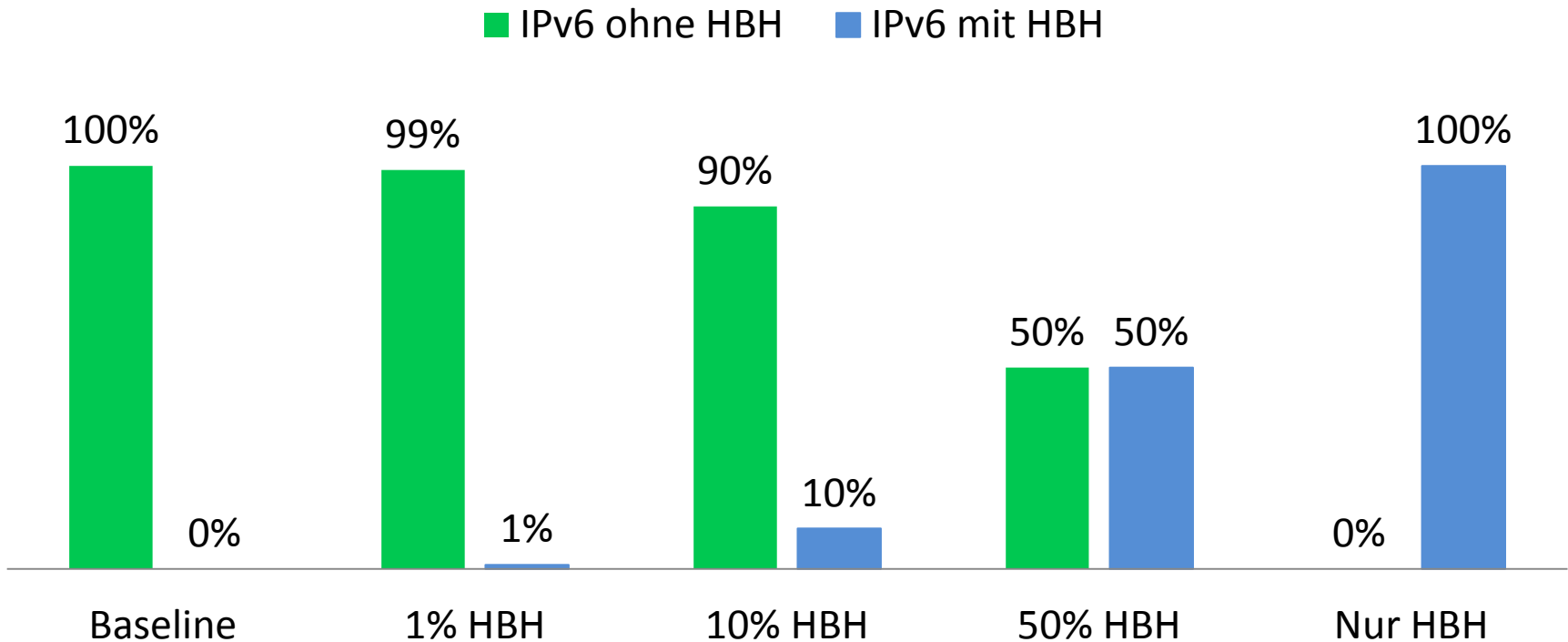
# Layer 3 Throughput with Extension Headers

## Juniper J2320 [kPackets/sec]



# Layer 3 Durchsatz mit Hop-by-Hop Options Header

- Es bestehen mögliche Leistungsauswirkung beim Einsatz von Hop-by-Hop (HBH) Options  
Worauf IETF RFC 5180 hinweist.

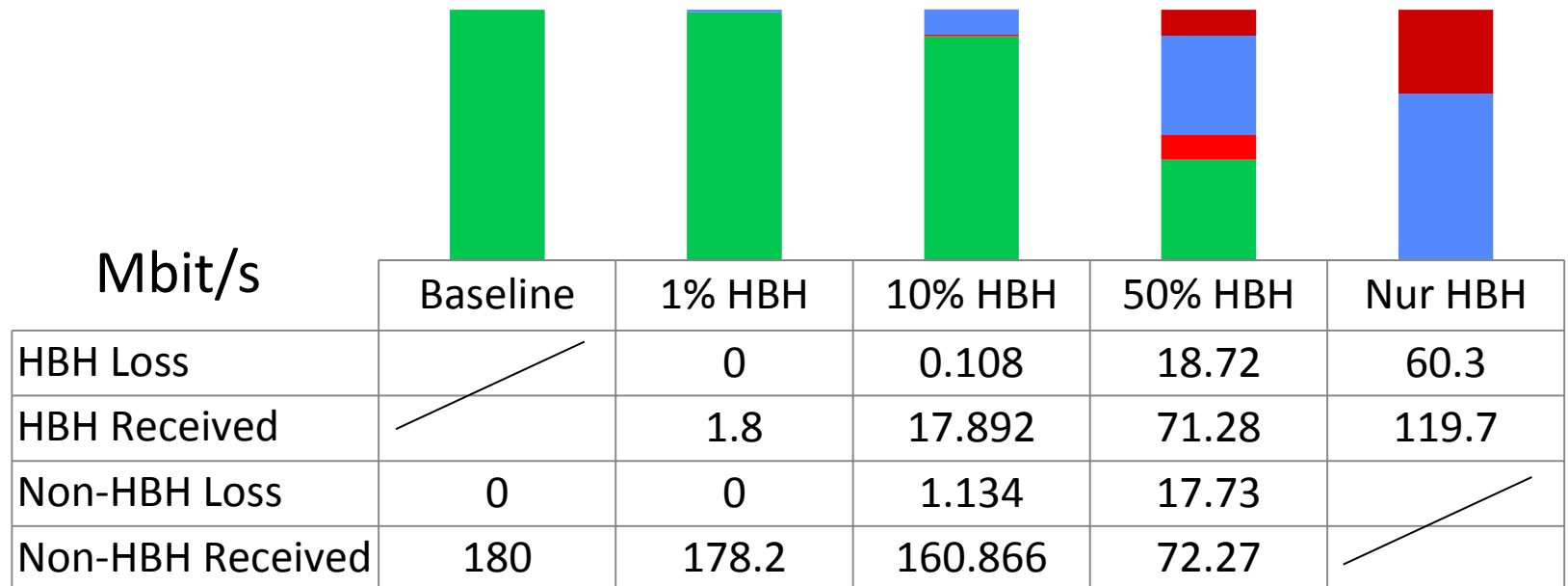


# Hop-by-Hop Extension Headers

## Checkpoint CP2210



■ Non-HBH Received   
 ■ Non-HBH Loss   
 ■ HBH Received   
 ■ HBH Loss

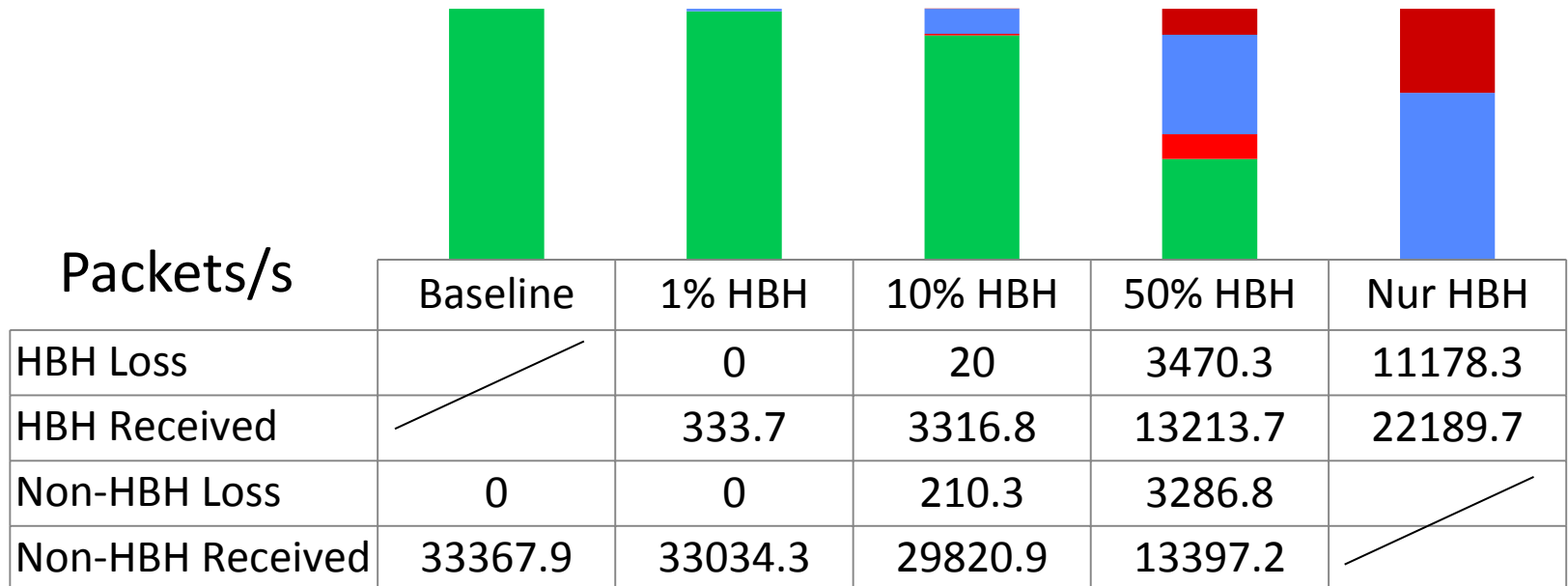


# Hop-by-Hop Extension Headers

## Checkpoint CP2210



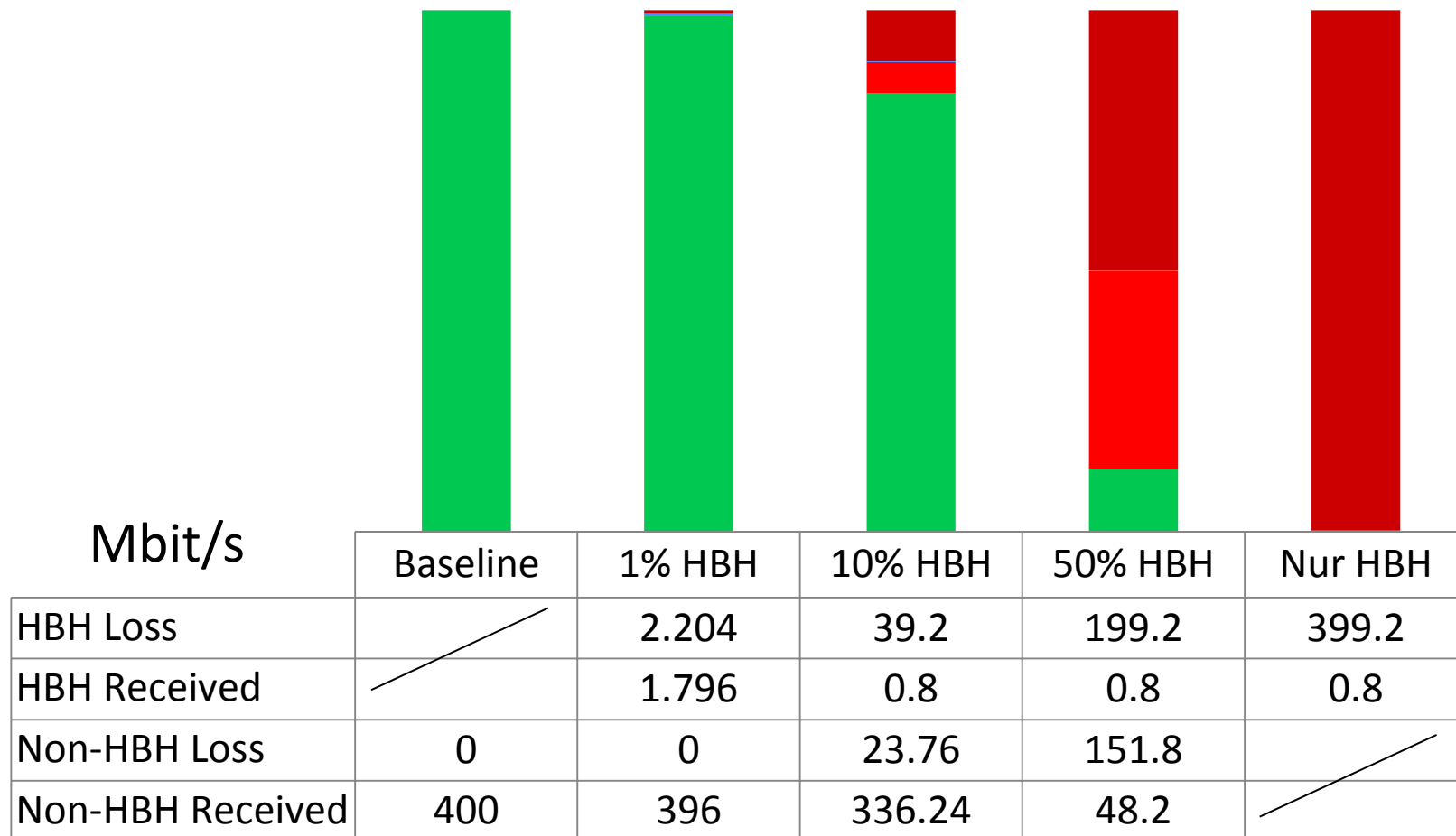
■ Non-HBH Received   
 ■ Non-HBH Loss   
 ■ HBH Received   
 ■ HBH Loss



# Hop-by-Hop Extension Headers Juniper J2320



■ Non-HBH Received   
 ■ Non-HBH Loss   
 ■ HBH Received   
 ■ HBH Loss

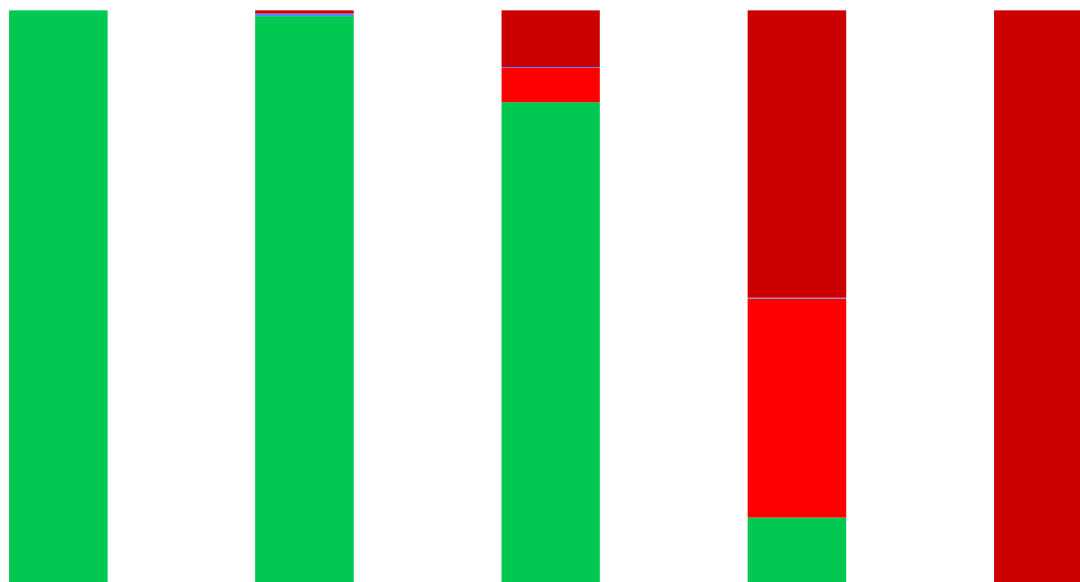


# Hop-by-Hop Extension Headers Juniper J2320



■ Non-HBH Received   
 ■ Non-HBH Loss   
 ■ HBH Received   
 ■ HBH Loss

Packets/s



|                  | Baseline                        | 1% HBH  | 10% HBH | 50% HBH | Nur HBH                         |
|------------------|---------------------------------|---------|---------|---------|---------------------------------|
| HBH Loss         | <del>                    </del> | 408.6   | 7266.8  | 36927.2 | 74002.7                         |
| HBH Received     | <del>                    </del> | 332.9   | 148.3   | 148.3   | 148.3                           |
| Non-HBH Loss     | 0                               | 0       | 4404.6  | 28140.3 | <del>                    </del> |
| Non-HBH Received | 74151                           | 73409.5 | 62331.3 | 8935.2  | <del>                    </del> |

# Danke für Ihre Aufmerksamkeit!

Ihre Ansprechpartner:

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