



# A “COMPLICATED” MONDAY OF INTERNET TRAFFIC

*On Monday May 12th  
( as seen at MINAP and NAMEX )*

Gianluca Sironi  
Special Projects  
**NAQUADRIA | PCIX**



## Internet Service Provider

Tier III Datacenter  
Colocation, Cloud  
Managed Services  
5 ISO certifications  
ACN qualification

[www.naquadria.it](http://www.naquadria.it)

## Internet Exchange Point

*managed by Naquadria*

Free membership  
Free 1 / 10 / 100 Gbps port  
Layer 2 PCIX-VSIX  
K-root node  
MS Cache, ...

[www.pcix.it](http://www.pcix.it)

- **Top 5 italian IXPs : MIX, NAMEX, MINAP, TOP-IX, VSIX**  
(ordered by traffic / peer # / ...)
- **Some other «minor» IXPs (GE-DIX, PCIX, ...)**
- **Analysis using traffic data publicly available**
- **Data collected mainly @ MINAP and NAMEX**  
( IXPManager-based , see <https://www.minap.it> and <https://www.namex.it> )
- **Focus on traffic pattern/deviation @ MINAP and NAMEX**



# MIX down Monday 12/05/2025

**DOWN @ MIX on Monday 12/02**

**( according to MIX communications )**

**Incident started around midnight (similar to a previous incident);**

**set of factors (control plane «instabilities» (bug) affecting the peering platform, subnet extension (+ scan) caused ARP broadcast, unallowed/foreign traffic on peering LAN)**

link [here](#)

**different kind of impacts on customers**

**traffic re-distribution ( as seen @ other IXPs )**



# Where we retrieve traffic data



see <https://www.ixpmanager.org/community/user-list>

**IXPManager-based:**  
IT (MINAP, NAMEX)  
IE (INEX)  
DE (BCIX, DO-IX, ...)  
RO (InterLAN)  
GR (GR-IX)  
SI (SIX)  
HR (CIX)  
[...]

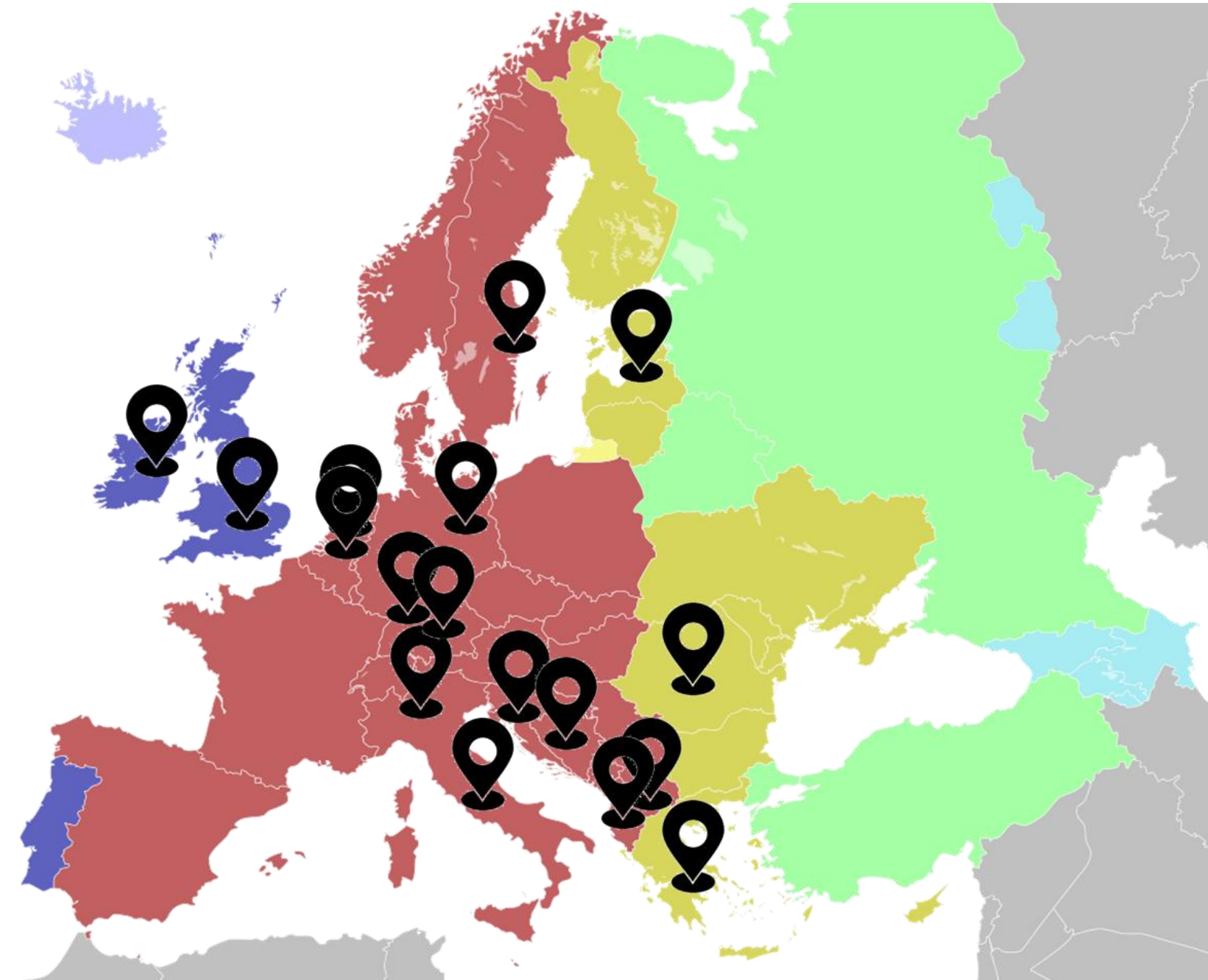


Image source: [https://en.wikipedia.org/wiki/Central\\_European\\_Time#/media/File:Time\\_zones\\_of\\_the\\_Greater\\_Europe.svg](https://en.wikipedia.org/wiki/Central_European_Time#/media/File:Time_zones_of_the_Greater_Europe.svg)





# Which traffic data we collect



e.g. [https://ixp.example.com/grapher/{graph}\[?id=x\]\[&period=x\]\[&type=x\].....](https://ixp.example.com/grapher/{graph}[?id=x][&period=x][&type=x].....)

API exposed

JSON files

current traffic [bps]



```
{
  "class": "ixp",
  "urls": {
    "png": "https:\\\\www.inex.ie\\ixp\\grapher\\ixp?period=day&type=png&category=bits",
    "log": "https:\\\\www.inex.ie\\ixp\\grapher\\ixp?period=day&type=log&category=bits",
    "json": "https:\\\\www.inex.ie\\ixp\\grapher\\ixp?period=day&type=json&category=bits"
  },
  "base_url": "https:\\\\www.inex.ie\\ixp\\grapher\\ixp",
  "statistics": {
    "totalin": 15013439801606864,
    "totalout": 15013959560329200,
    "curin": 158715231920,
    "curout": 158713872624,
    "averagein": 125566129180.59367,
    "averageout": 125570476225.09074,
    "maxin": 222438012592,
    "maxout": 222348641336
  },
  "params": {
    "type": "json",
    "category": "bits",
    "period": "day",
    "protocol": "all",
    "id": 1
  }
}
```

source: <https://docs.ixpmanager.org/grapher/api/>





# Which traffic data we collect / 2



ISO 8601 timestamp  
Mon to Sun week

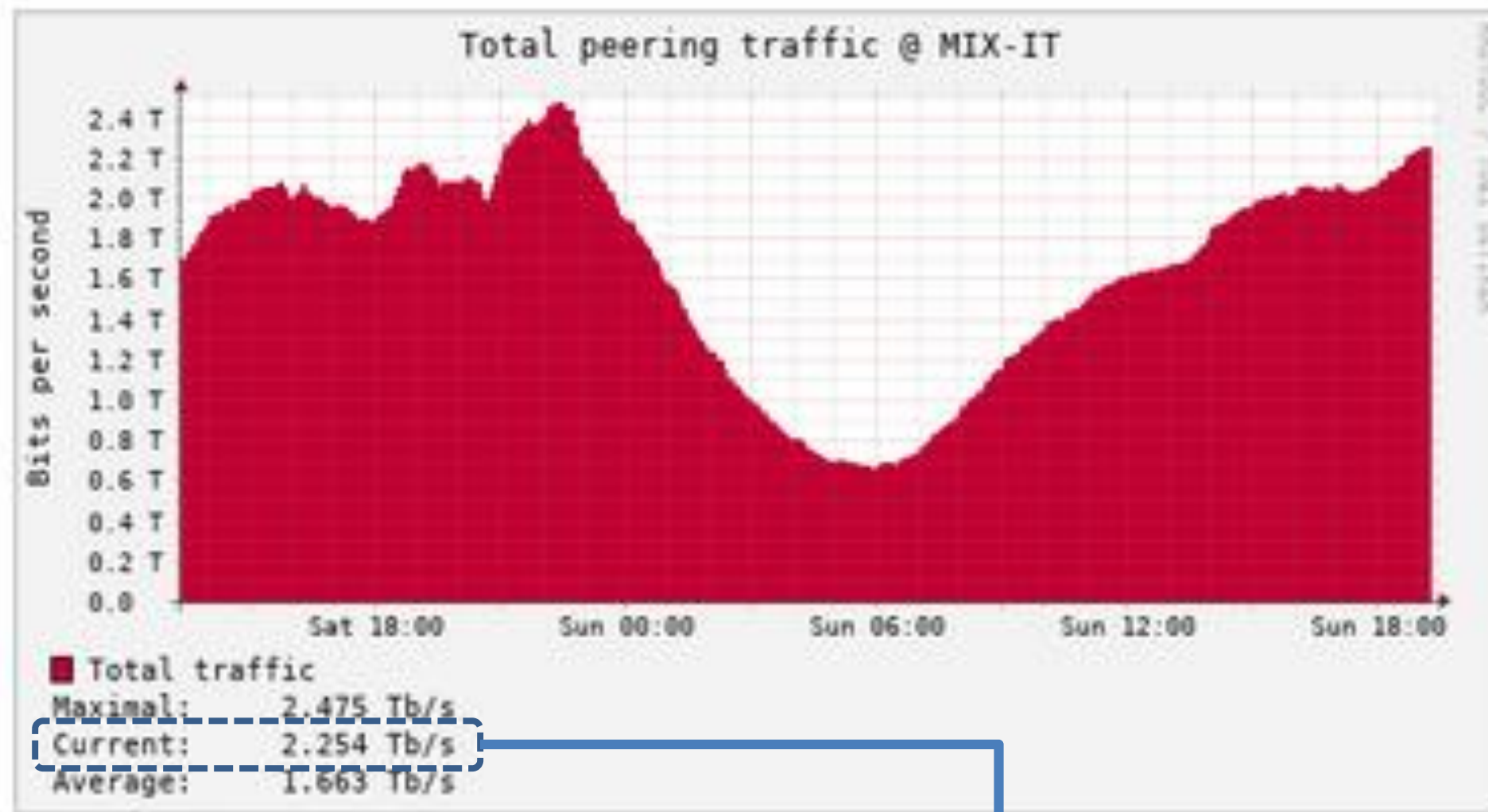
**10m «sampling»**  
**144 samples / day**  
**1008 samples / week**  
**~ 53k samples / year**

```
▼ statistics:
  totalin:      18553775624851200
  totalout:     18574859820993600
  curin:        187859791184
  curout:       188403157184
  averagein:    155391755652.0201
  averageout:   155368340209.32663
  maxin:        358128403480
  maxout:       355973849680
  maxinat:      "2023-09-27T19:50:00.000000Z"
  maxoutat:     "2023-09-27T19:50:00.000000Z"
▼ params:
  type:         "json"
  category:     "bits"
  period:       "day"
  protocol:     "all"
  id:           1
```

e.g CSV dataset record: **YYYYMMDDThhmmssZ,187859791184,188403157184[,...]**



# Where we retrieve traffic data / 2



**Workaround (python script)**

**\*/5 call MIX stats public site**

**download PNG**

**import pyesseract lib**

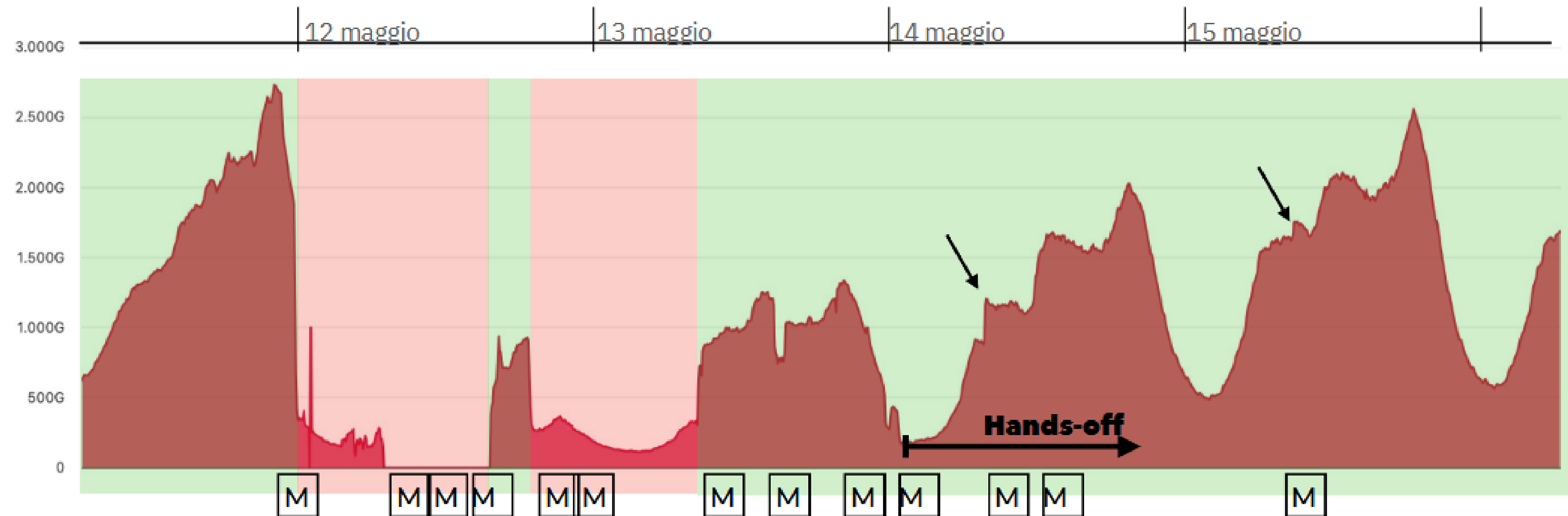
**extract “current traffic” text  
( parse current Tb/s or Gb/s )**

**append CSV dataset  
(timestamp,traffic)**



# MIX update @ ITNOG 9

## MIX statements during “IXP updates” @ ITNOG 9 ( 19–20/05/2025 )



link [here](#)



# RIPE NCC update @ ITNOG 9

## RIPE NCC report during “RIPE NCC” @ ITNOG 9 ( 19–20/05/2025 )

### Overall path differences using -4hrs (before) as baseline

#### Baseline vs +4hrs (after):

- IT.MIX-IT -38
- IT.MINAP Milan +20
- AS174 Cogent +10
- AS12779 IT.Gate +8
- AS201333 Naquadria +7
- AS41327 Fiber Telecom +7
- DE.DE-CIX Frankfurt +7
- AS1299 Arelion -7
- AS9002 RETN +7
- AS49088 TELMEKOM +6

#### Baseline vs +24hrs (after):

- IT.MIX-IT -291
- AS3257 GTT +185
- AS174 Cogent +111
- IT.MINAP Milan +91
- AS49088 TELMEKOM +82
- AS41327 Fiber Telecom +78
- AS6762 Telecom Italia Sparkle +49
- AS6517 ZEROMIST +47
- IT.Namex Rome +38
- AS34428 8ROUTE +33

link [here](#)



# RIPE NCC update @ ITNOG 9 / 2

| IXP               | -4h | +4h | +24h |
|-------------------|-----|-----|------|
| IT.DE-CIX Palermo | 8   | 8   | 7    |
| IT.Equinix Milan  | 8   | 9   | 21   |
| IT.Ge-DIX         | 1   | 1   | 1    |
| IT.MINAP Milan    | 78  | 98  | 169  |
| IT.MIX Palermo    | 0   | 0   | 4    |
| IT.MIX-IT         | 292 | 254 | 2    |
| IT.Namex Bari     | 0   | 0   | 1    |
| IT.Namex Napoli   | 4   | 4   | 4    |
| IT.Namex Rome     | 80  | 84  | 118  |
| IT.PCIX           | 7   | 8   | 11   |
| IT.TOP-IX         | 5   | 6   | 22   |
| IT.VSIX           | 0   | 0   | 14   |

link [here](#)

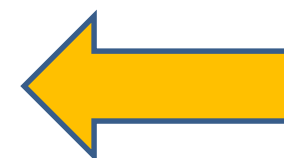
**Report on Italian IXPs only**

**MINAP ~ 2x after 24 h**

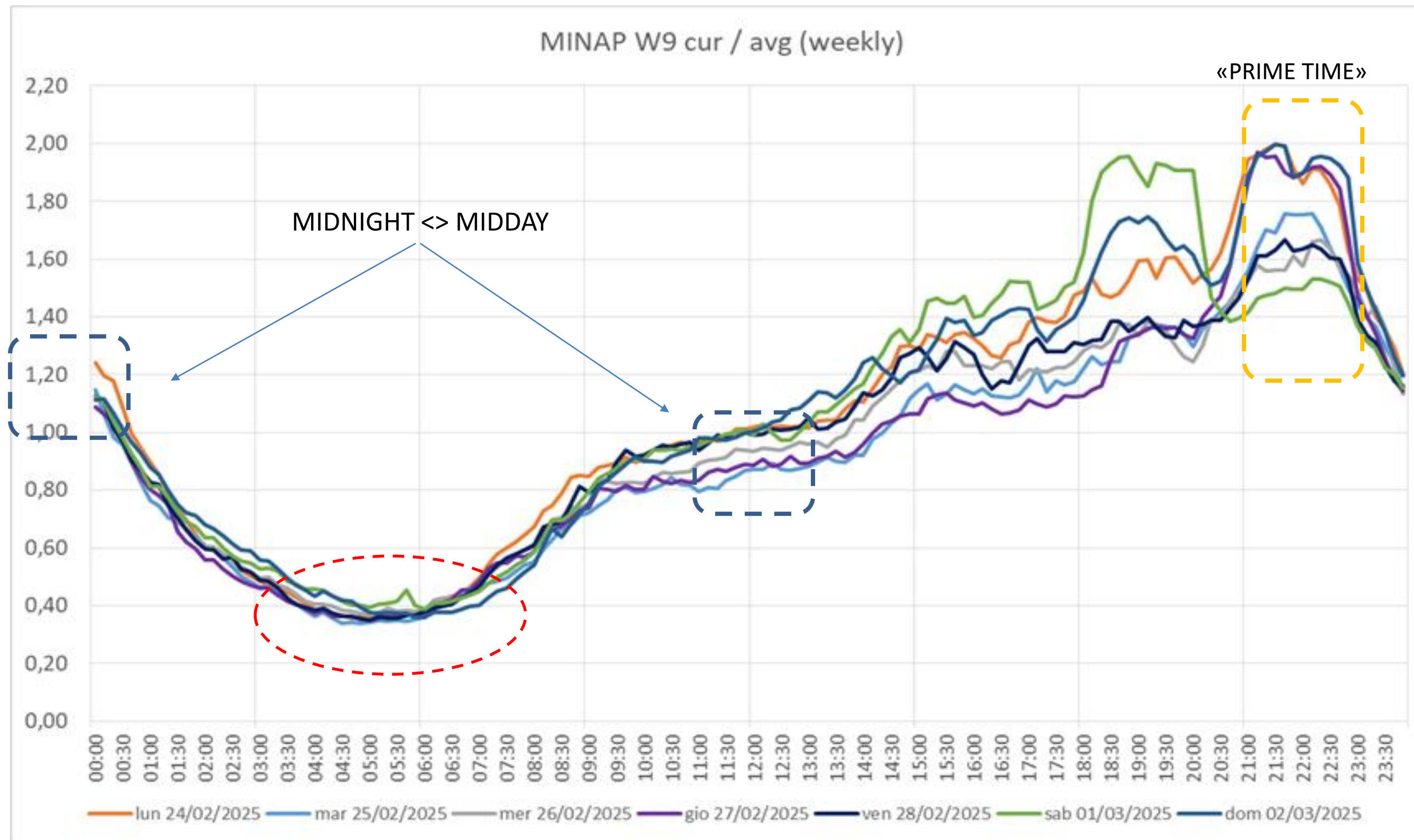
**NAMEX ~ +50% after 24 h**

**TOP-IX ~ 4x after 24 h**

**PCIX**  
**K-root node**  
**Mon/Tue traffic ~ 4x**

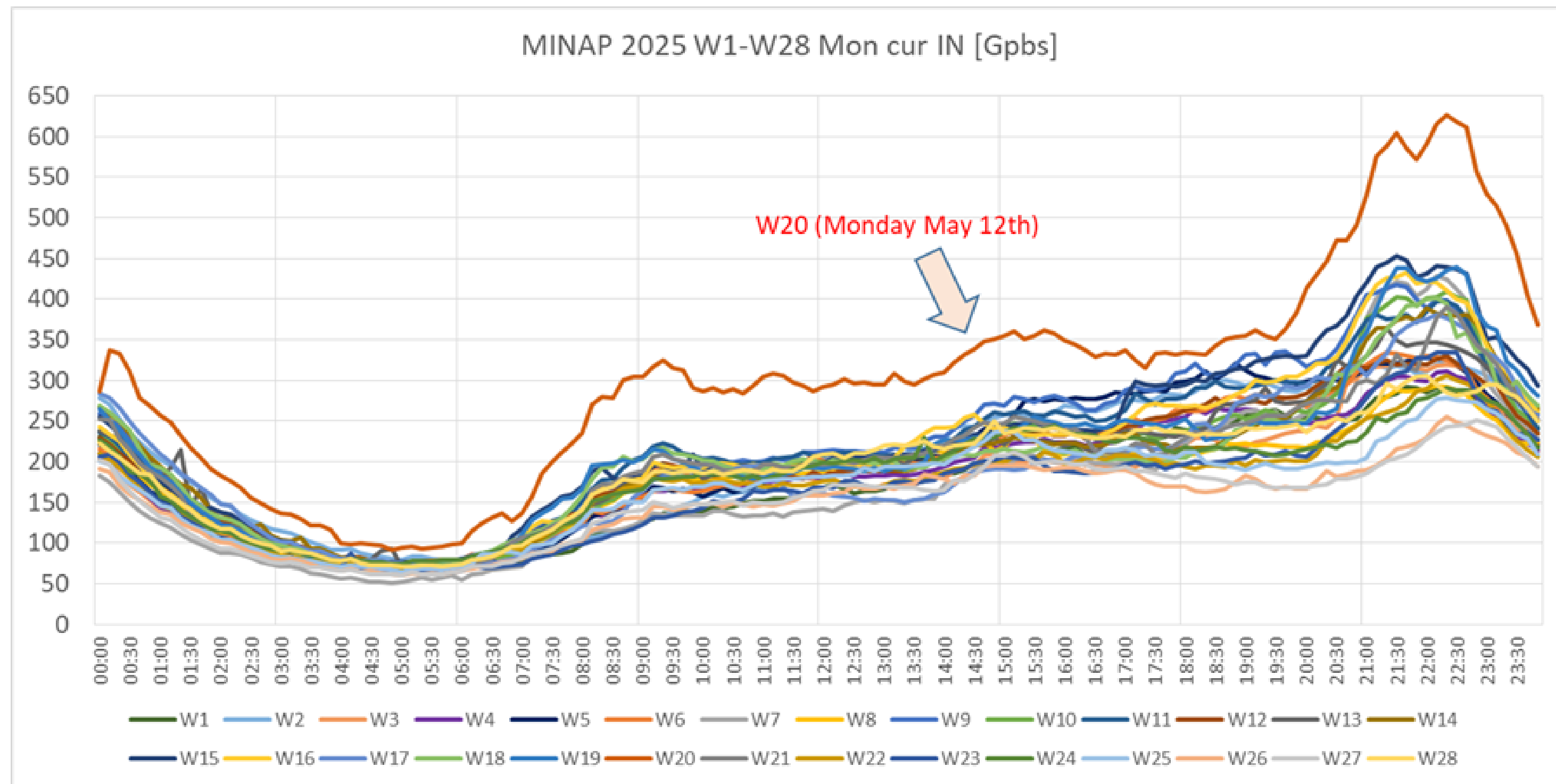


# EX. : W9 MINAP norm to Week AVG



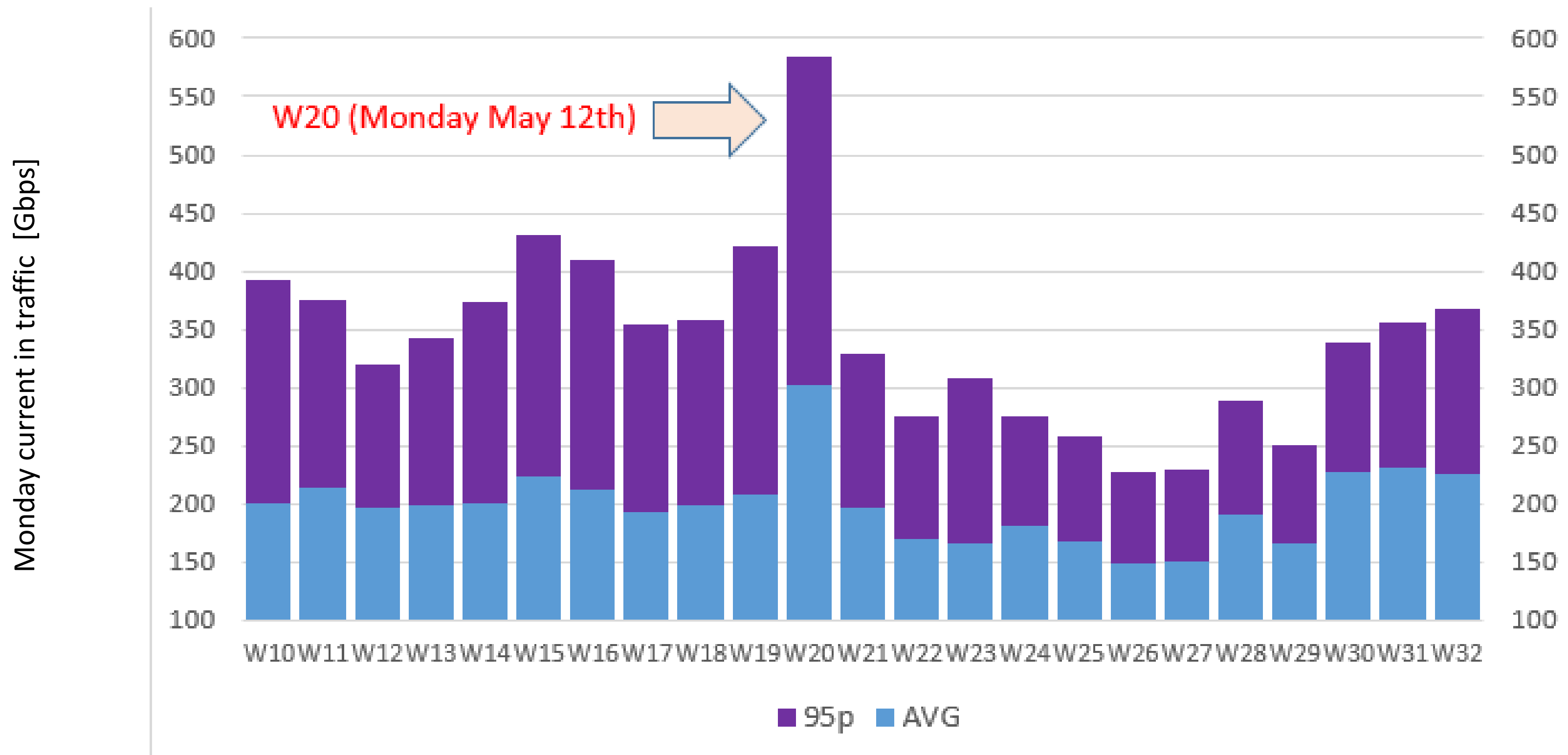
# MINAP Monday traffic W1-W28

Monday current in traffic [Gbps]

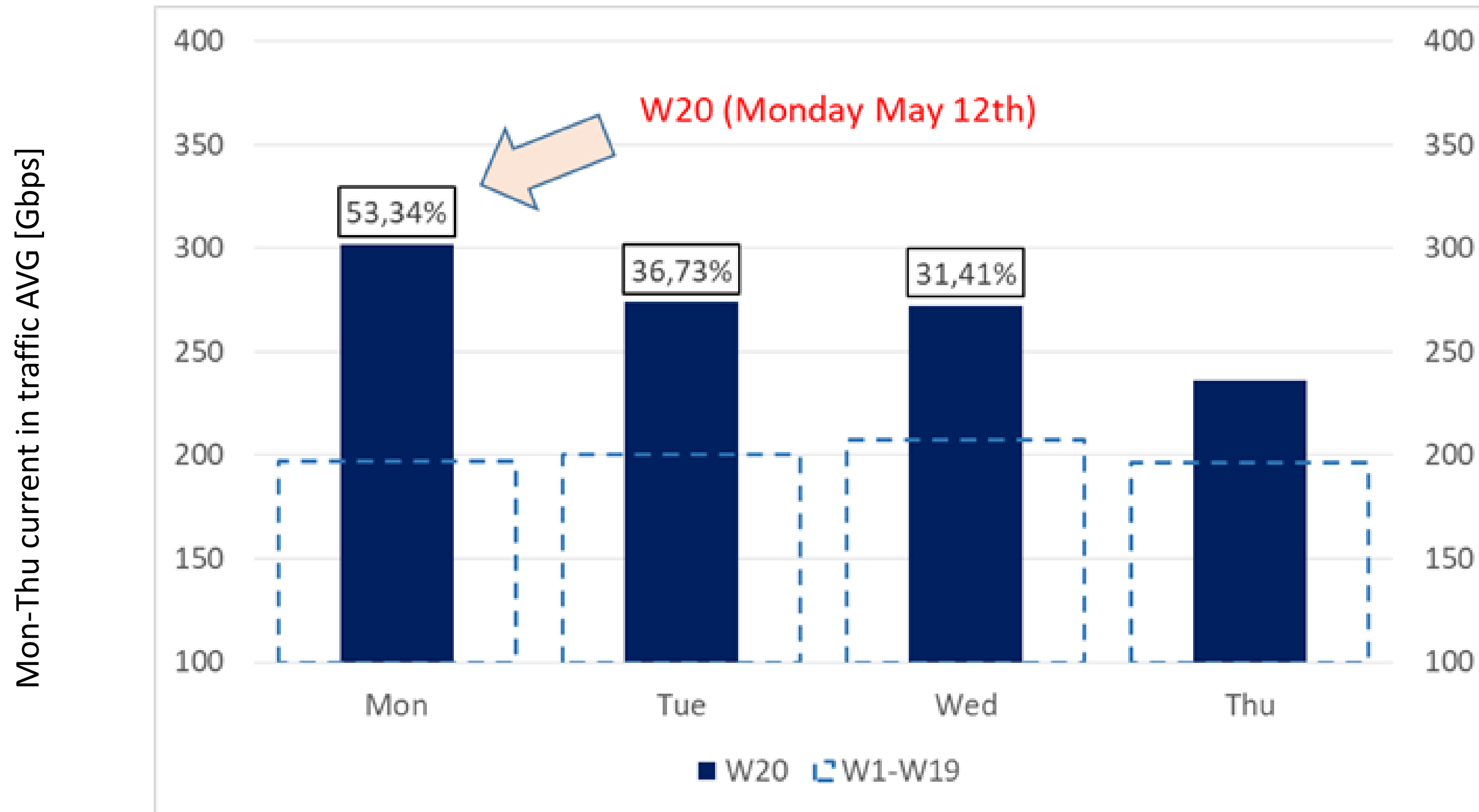




# MINAP Monday traffic W10-W32

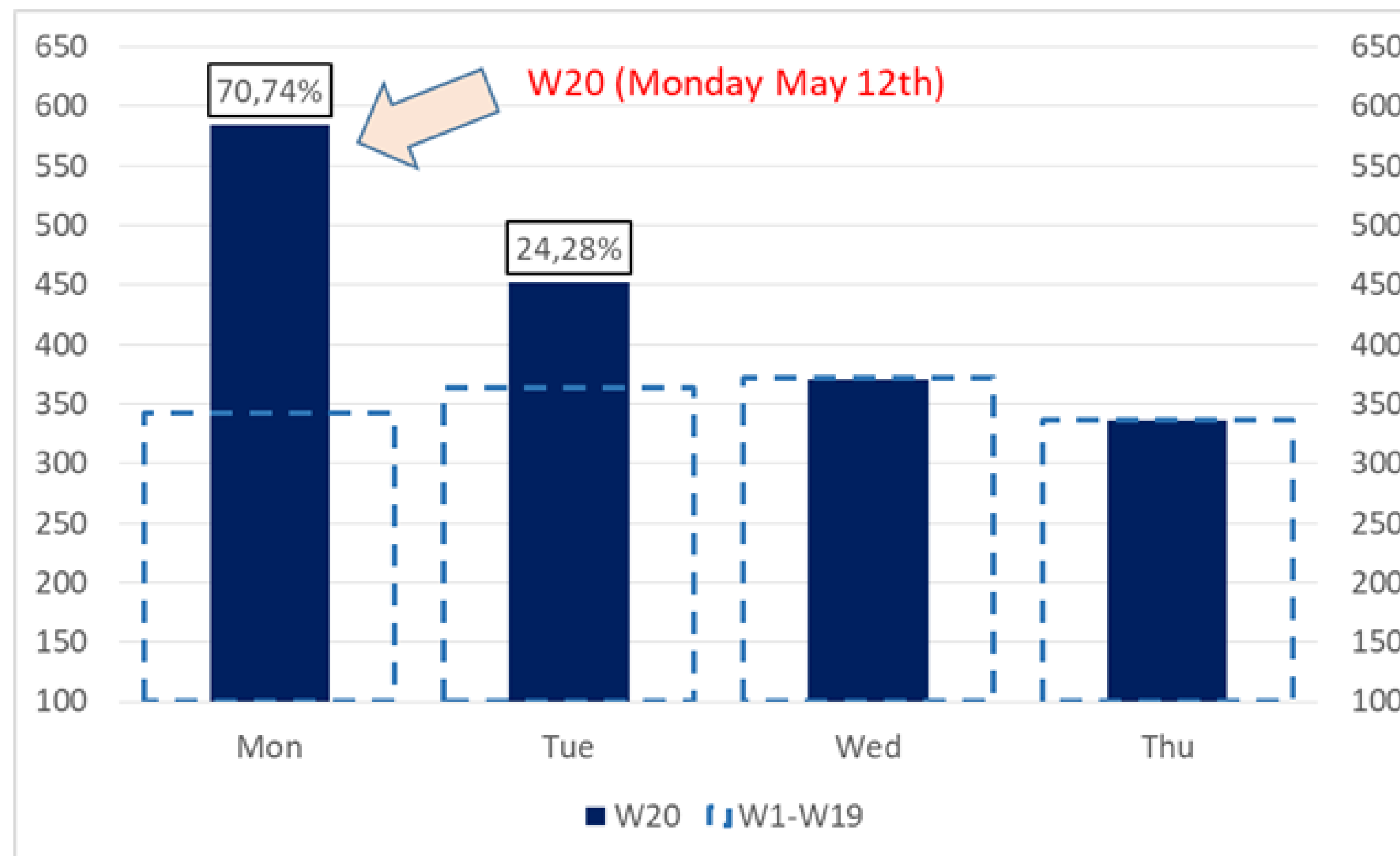


# MINAP Mon–Thu W1–W19<>W20 AVG



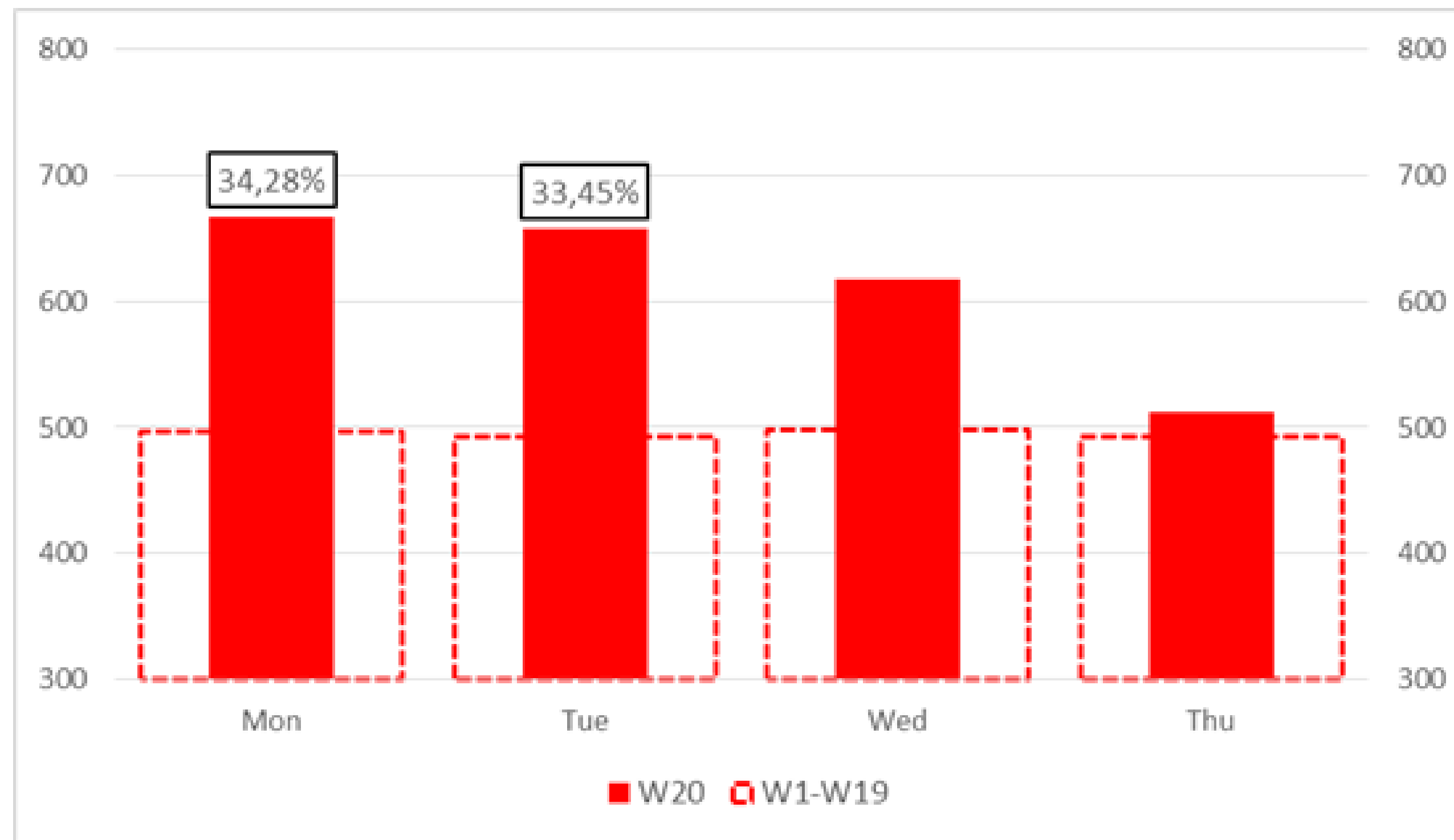
# MINAP Mon–Thu W1–W19<>W20 95p

Mon-Thu current in traffic 95p [Gbps]



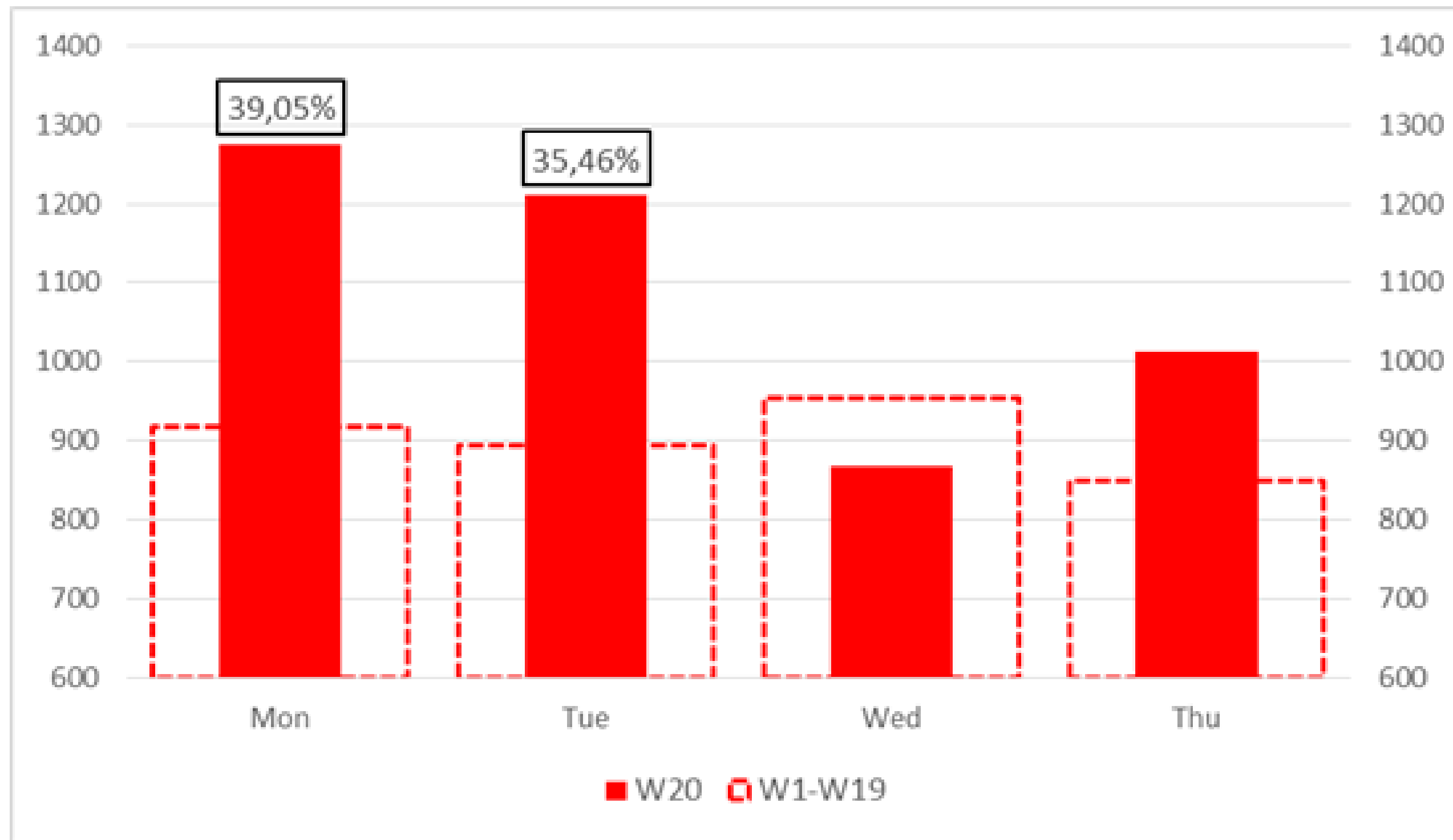
# NAMEX Mon-Thu W1-W19<>W20 AVG

Mon-Thu current in traffic AVG [Gbps]



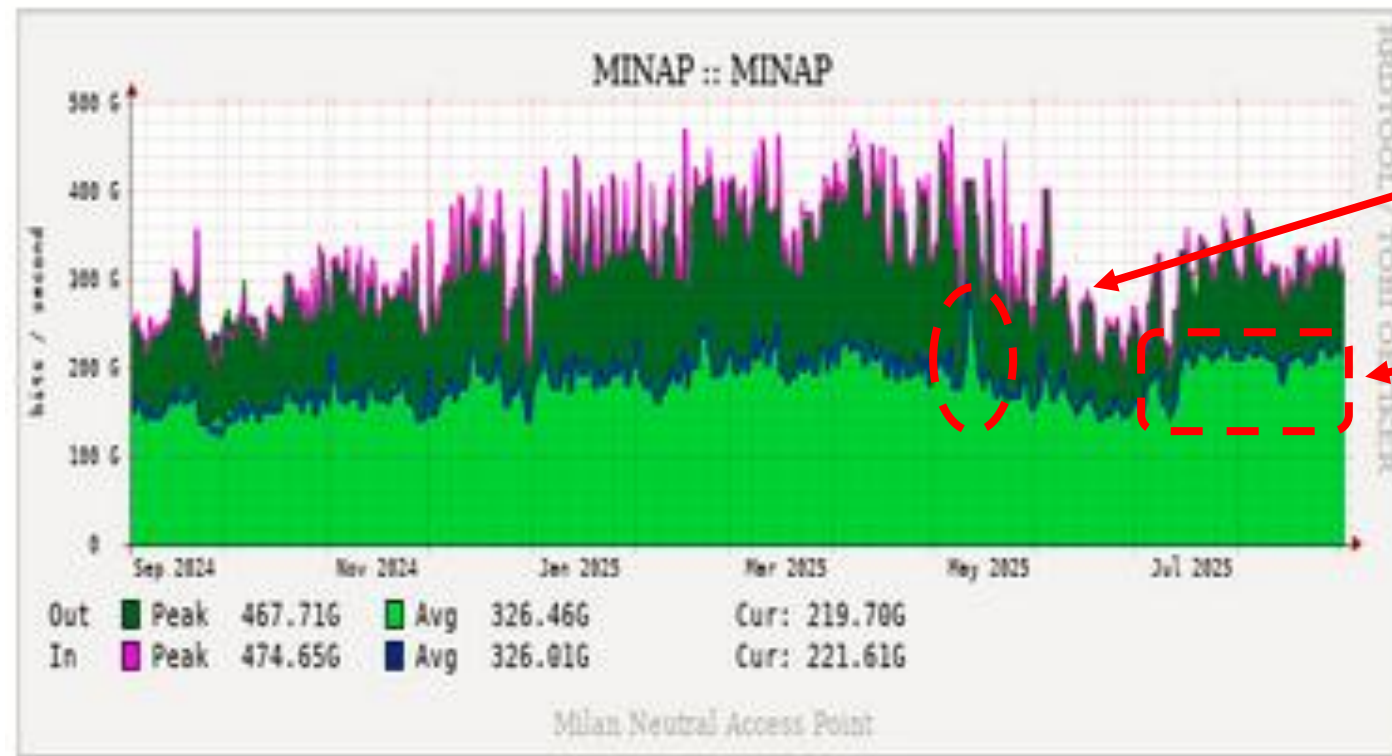
# NAMEX Mon–Thu W1–W19<>W20 95p

Mon-Thu current in traffic 95p [Gbps]





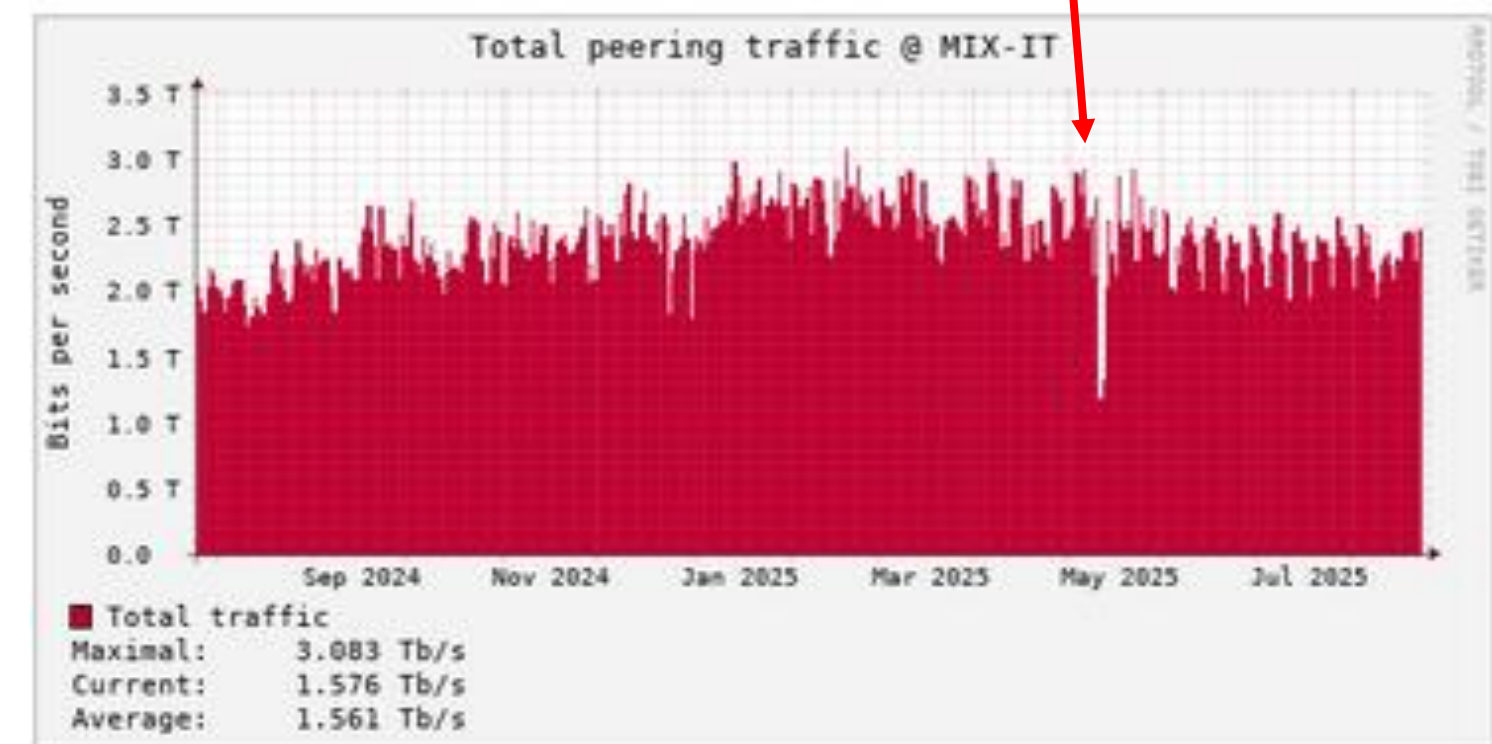
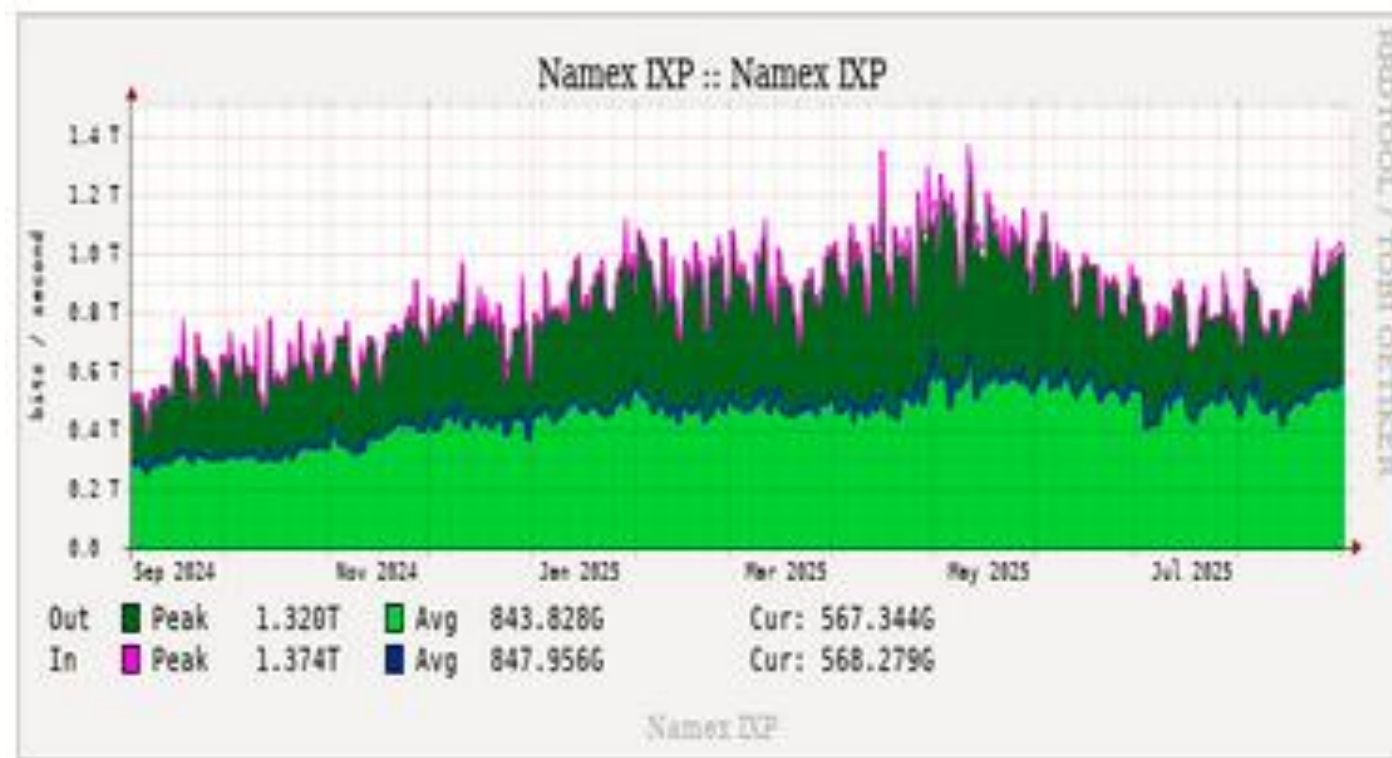
# MINAP/NAMEX/MIX (yearly)



Peak on 12/05/2025

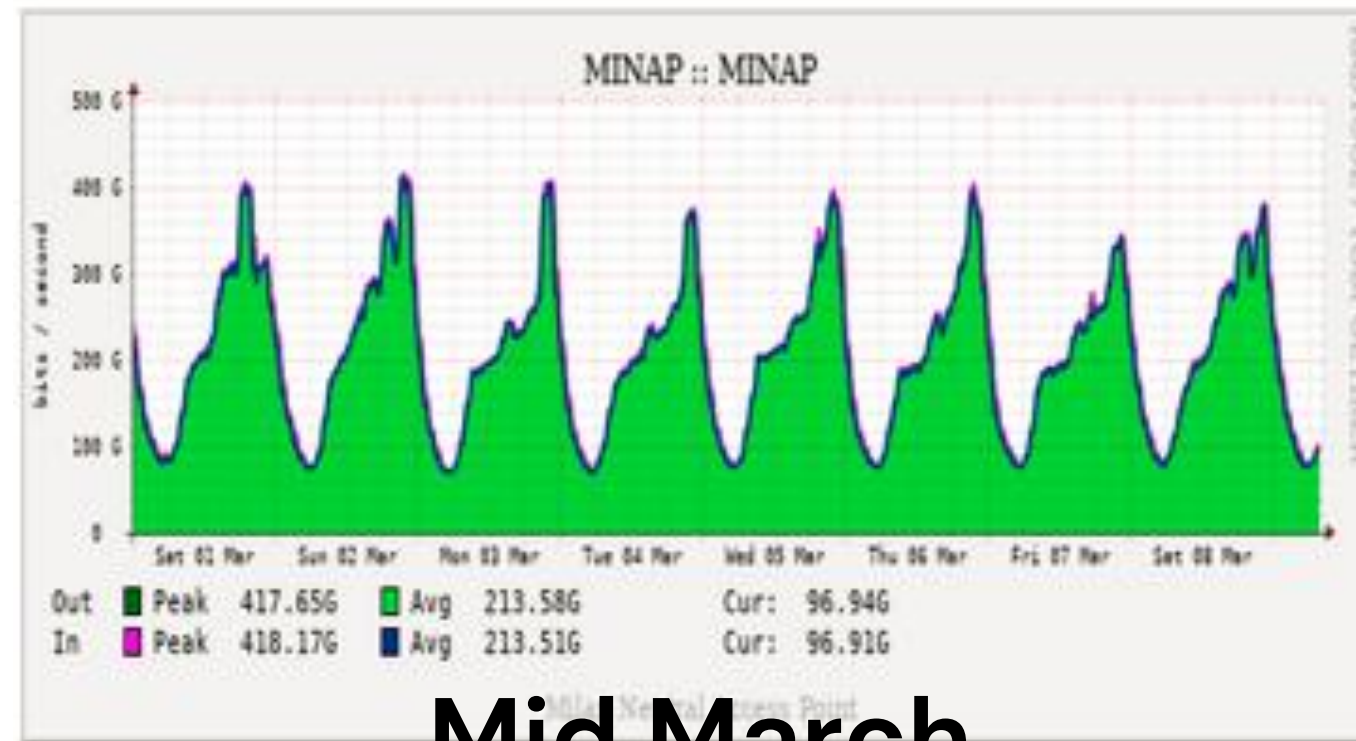
Daily traffic pattern change  
(mainly due to ByteDance)

Down on 12/05/2025

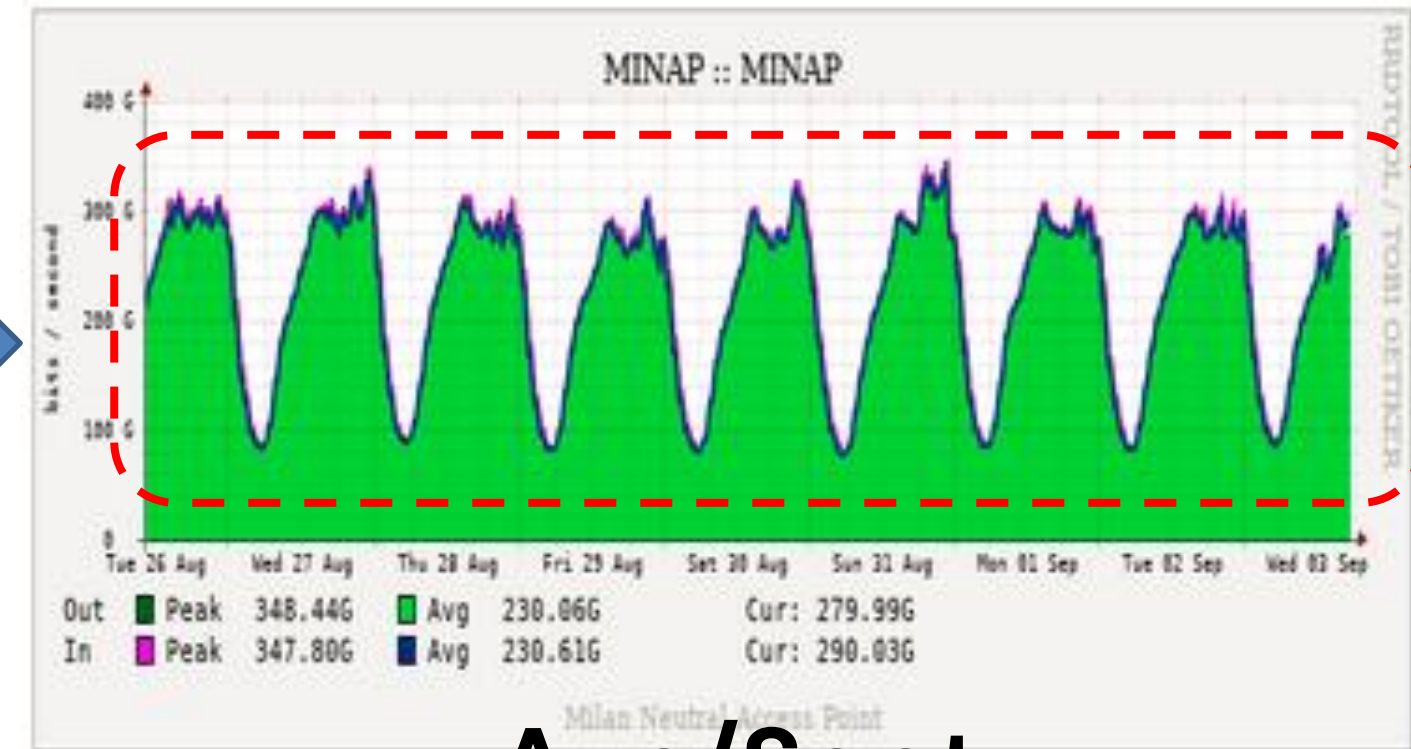




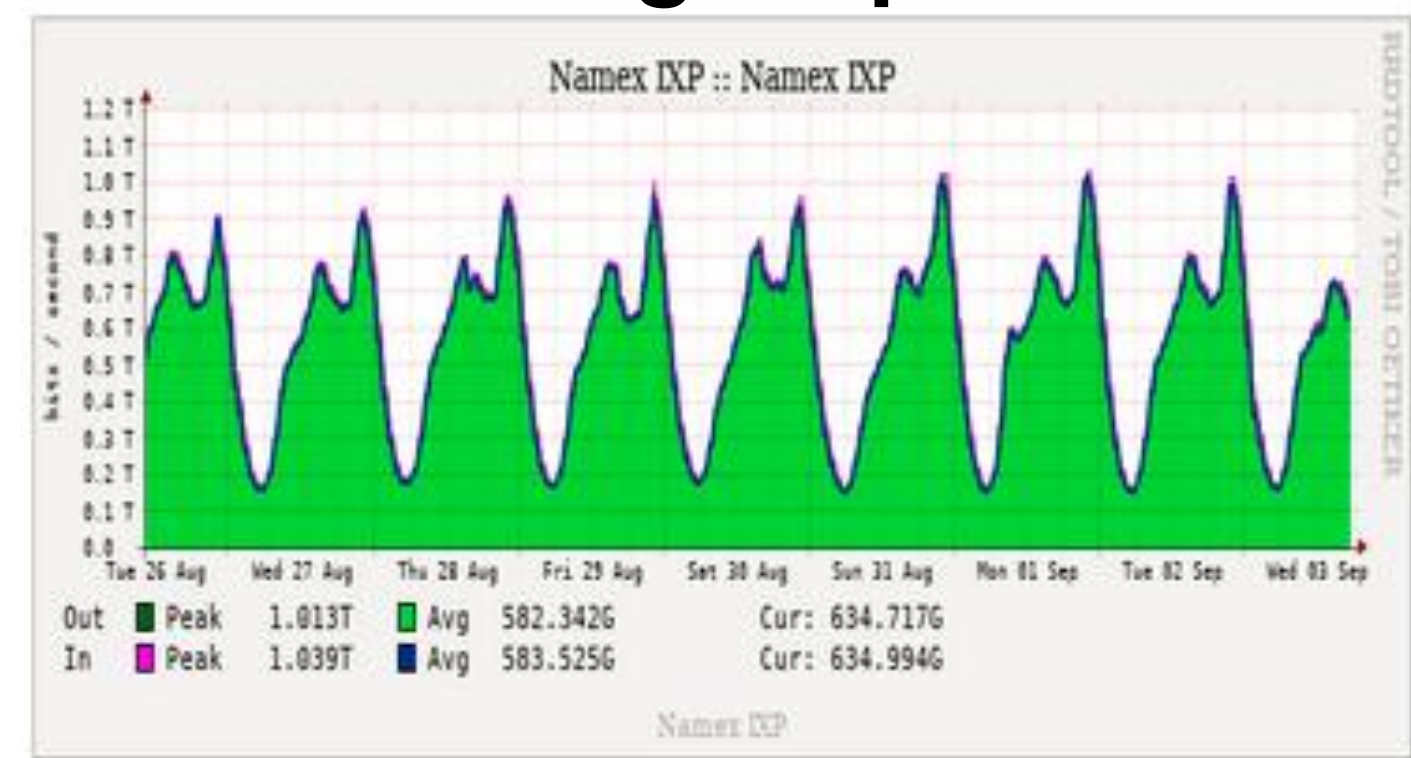
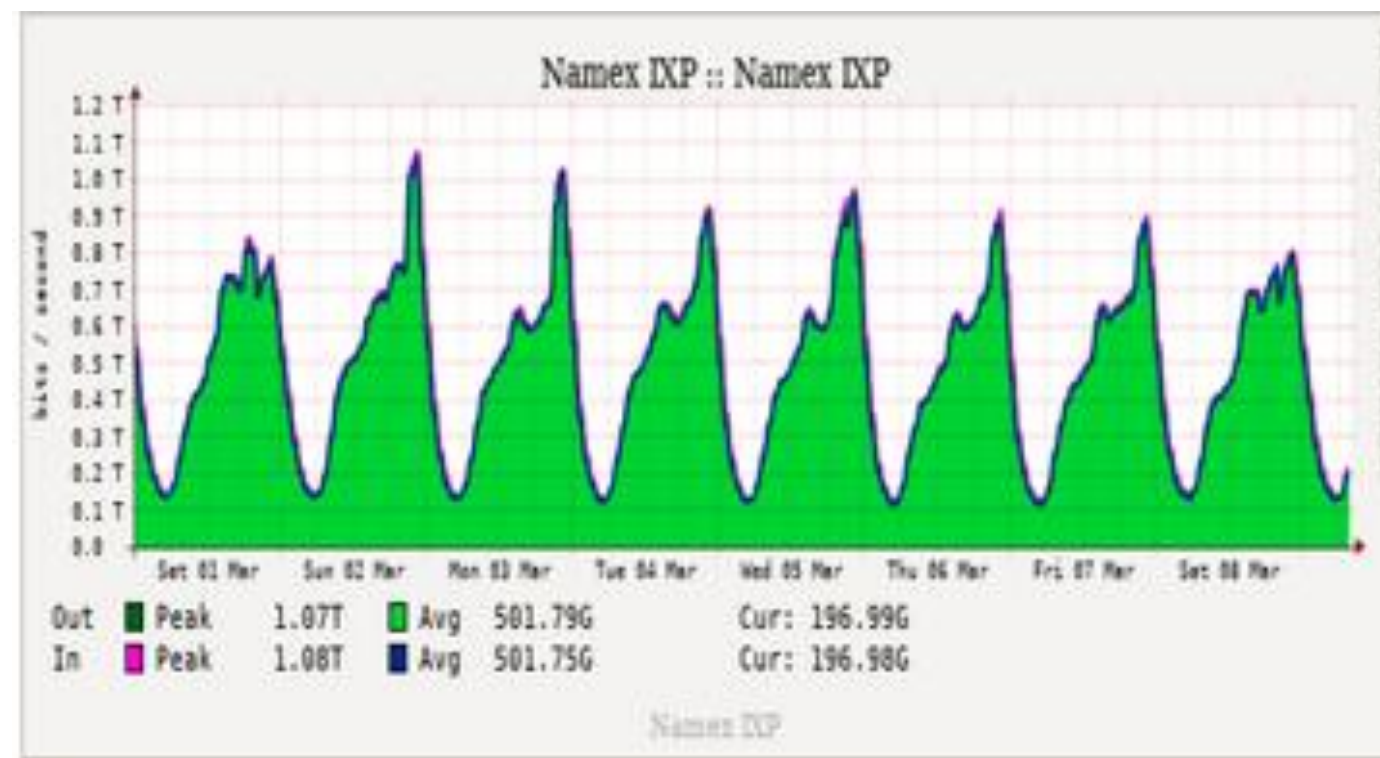
# MINAP and NAMEX (weekly)



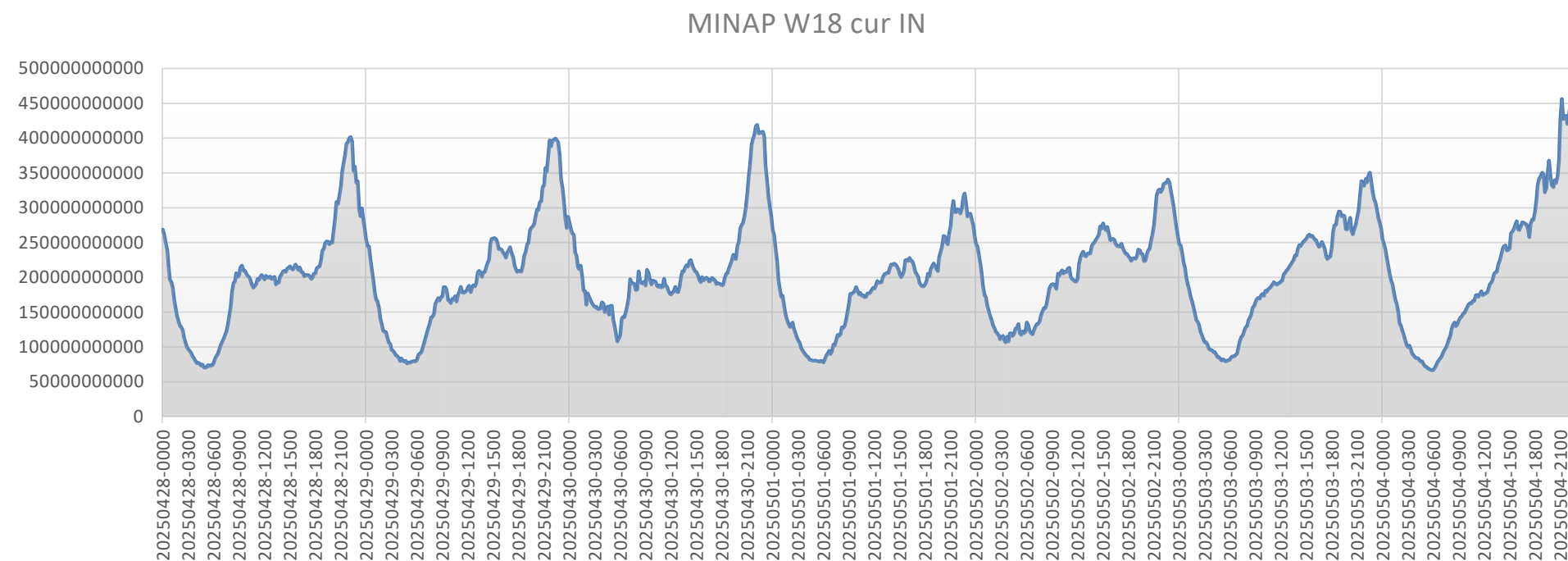
Mid March



Aug/Sept

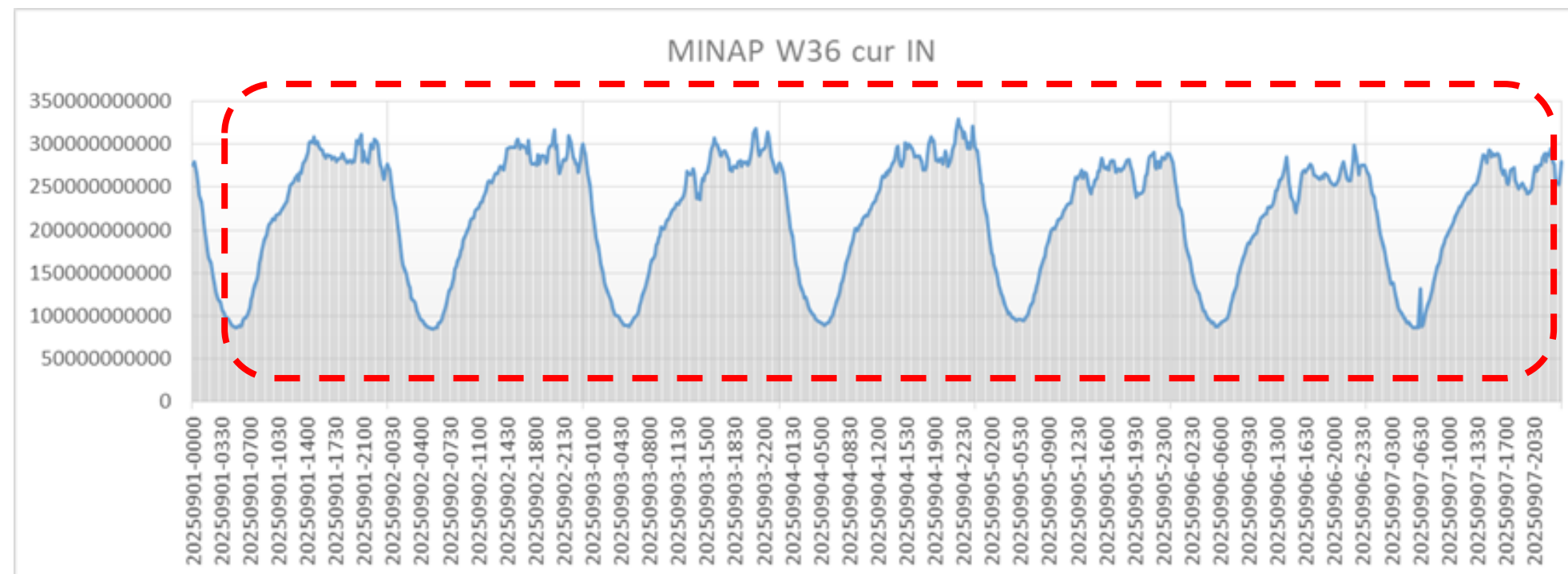


# MINAP W18 <> W36 traffic pattern



**Significant daily traffic pattern change**

**Most during working hours (9am-6pm)**

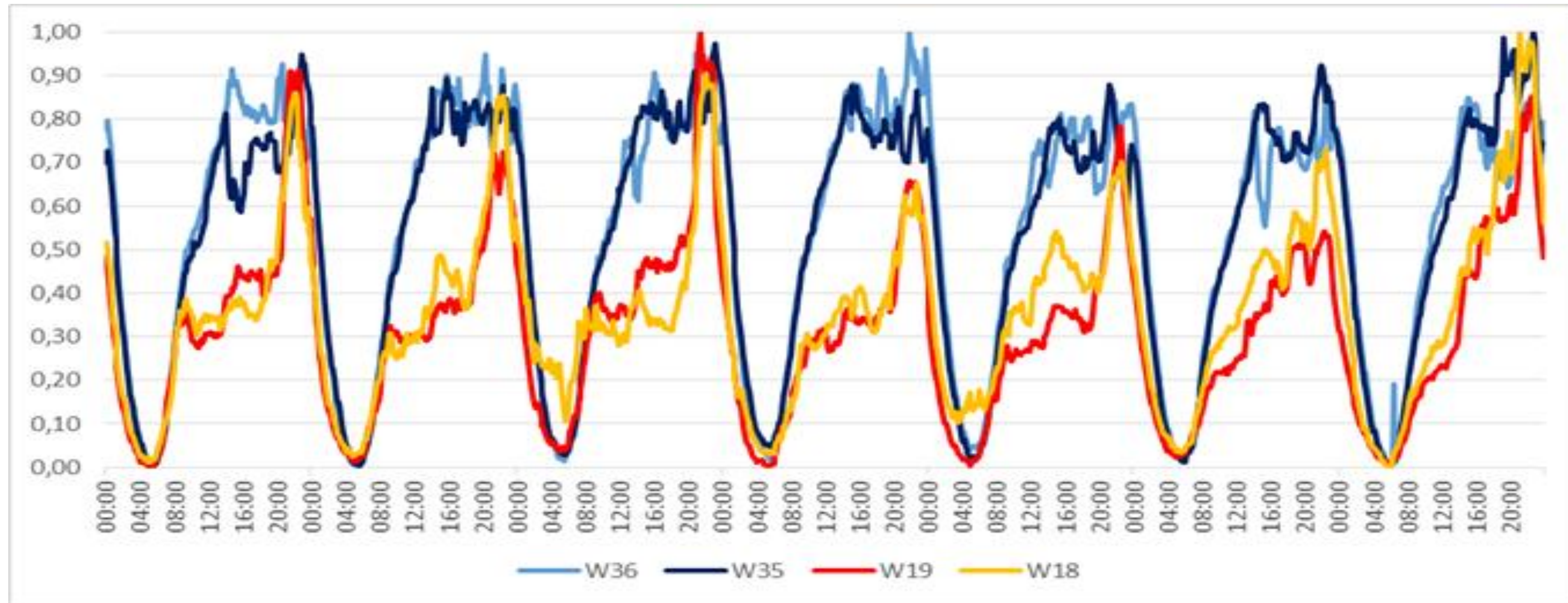


**Week correlation:**

**W36-W18 = 0,815**



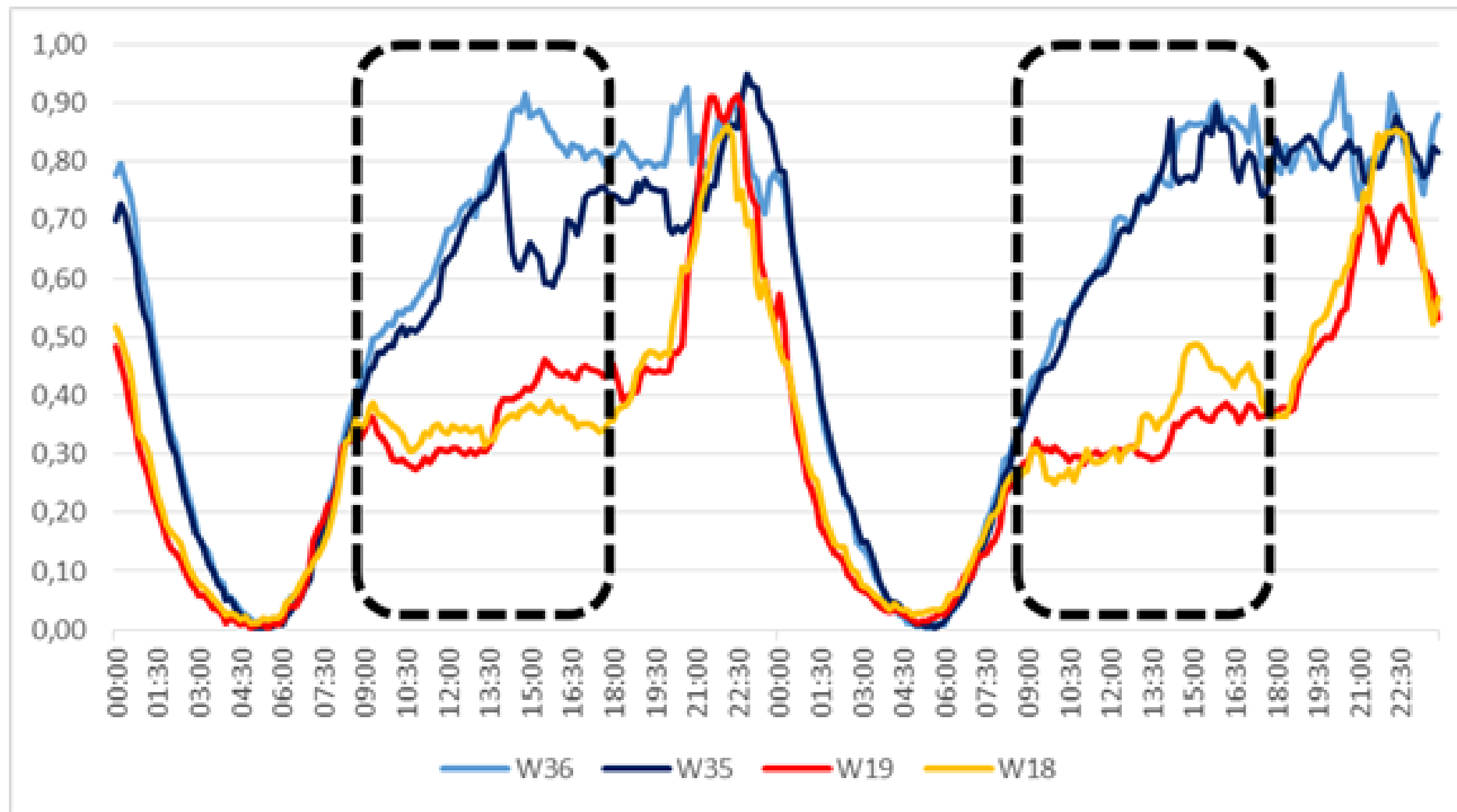
# MINAP min-max n [W18-19,W35-36]



**min-max normalization (weekly-based)**

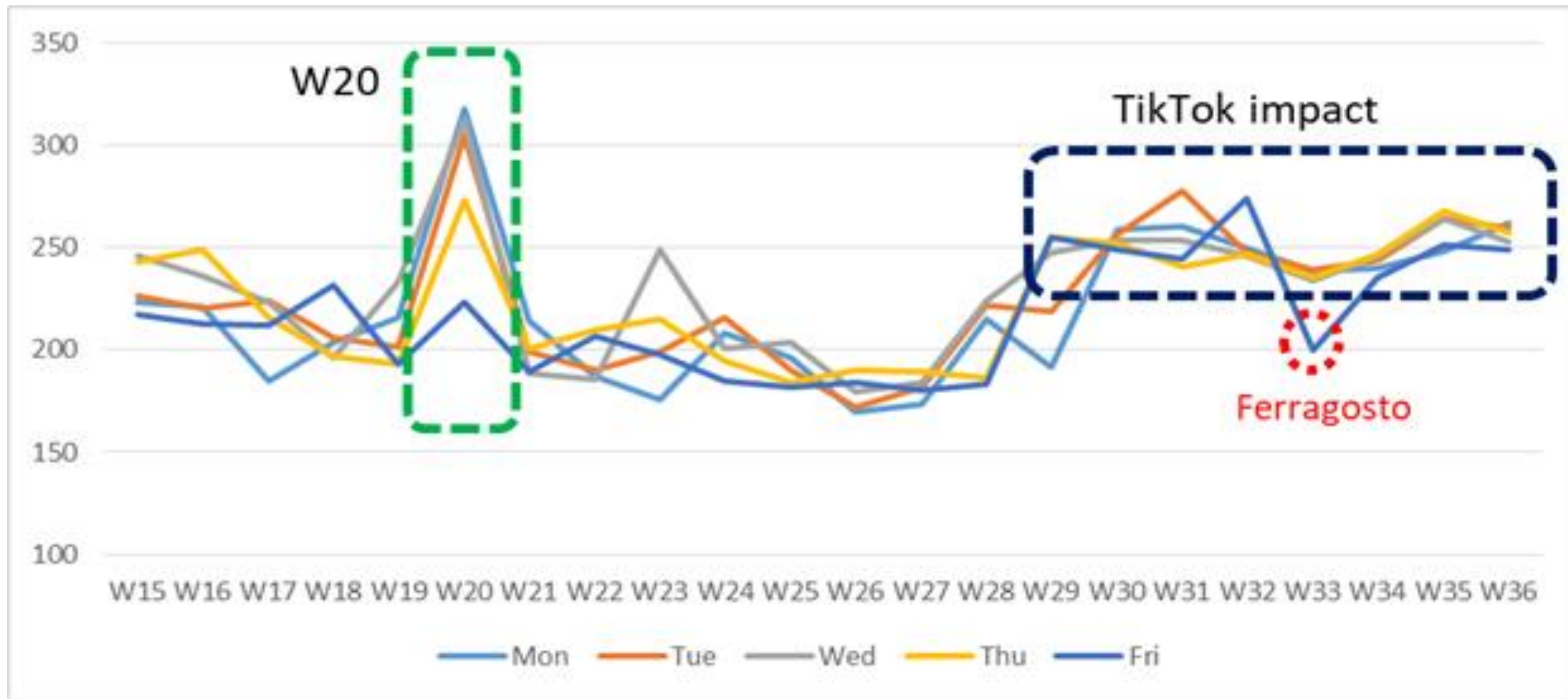
**correlation: W19-W18: 0,944 | W36-W35 0,969 | W35-W19 0,861**

# MINAP [W18-19,W35-36] Mon Tue



**working hours (9-18) traffic pattern change**

# MINAP W.H. AVG W15-W36



Working Hours (9–18) traffic average [Gbps]



**More questions than answers ...**

- **IMHO a missed opportunity**
- **Are IXPs “Essential Entities” ? ( from a NIS2 perspective )**
- **Which is the “Italian Internet” level of resilience ?**
- **Different kind of impact on customers ?**
- **Impact on ISP not multi-homed ?**
- **Mid term IXPs evolution ( e.g. ByteDance @ MINAP )**



**QUESTIONS?**

**COMMENTS?**



# THANK YOU FOR YOUR ATTENTION

*Gianluca Sironi* NAQUADRIA | PCIX

