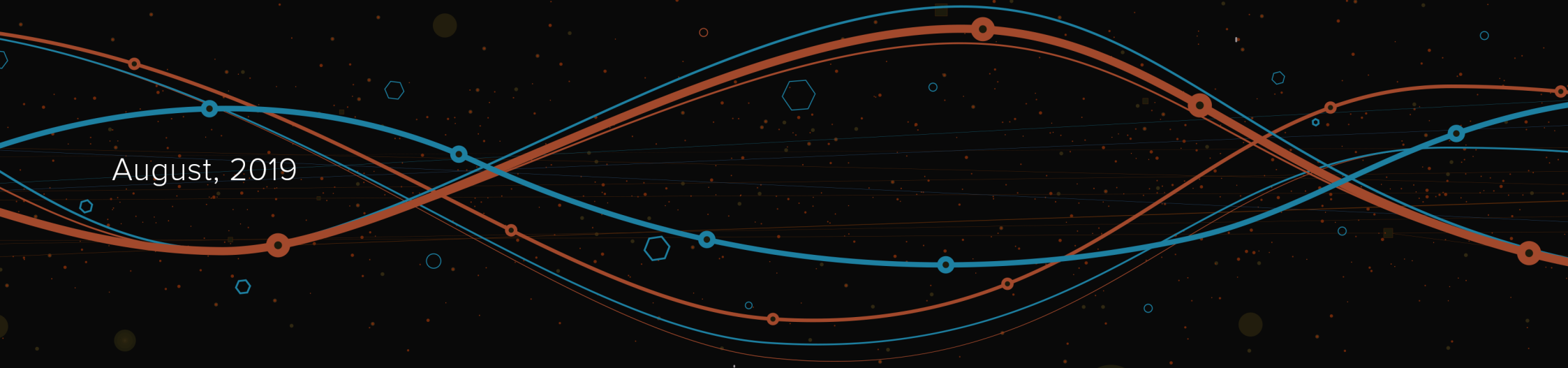
NOCTION
NETWORK INTELLIGENCE

Tier 1 Carriers

Performance Report



August, 2019

www.noction.com

Disclaimer:

The data presented in this report card is intended for information purposes only and is not to be interpreted as any form of promotion or debasement for carriers herein named. Information is obtained from the Intelligent Routing Platform Lite instances, where the compulsory consent of the legal entities for collection of such information is part of the Terms and Conditions document.

The data collection method comprises of a Netflow collector looking at destinations an installed network is speaking to and the explorer component then performing periodic probing via ICMP, UDP, and TCP_Syn, checking the performance metrics. The presented data is well sampled, as most of the IRP Lite enhanced networks are typically speaking to around a third of the routing table each day.

The presented report offers network professionals a first-hand view into the general Internet performance as well as the performance of specific internet carriers. It can be used as a trustworthy reference when negotiating and/or developing a mature multihoming strategy for the Internet Connectivity.

3.343
billion probes

The statements in the paper that follows are data-driven and based on the analysis of **3.343 billion** successful probes performed by Noction IRP Lite instances. All data is aggregated per carrier on a daily basis and accounts for many thousands of successful probes. A control group (labeled C) is used as a base for comparison. The control group aggregates the average for all transit providers in a network, including Tier 1 carriers.

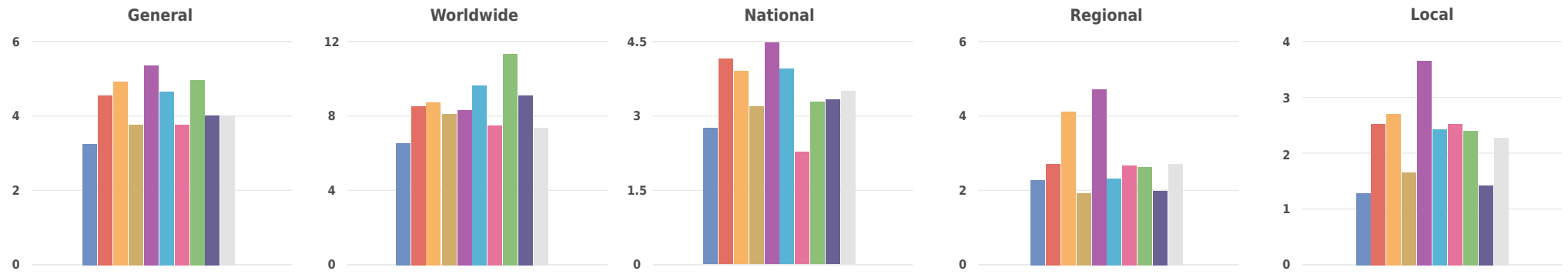
We combat bias by utilizing the types of data mentioned above as opposed to third party surveys or the information provided by the carriers themselves.

The report focuses on Tier 1 carriers performance results in the US for the month of August 2019. Rare data points from distant locations e.g. Alaska or Hawaii have been omitted. The analysis is presented based on the following four levels of aggregation:

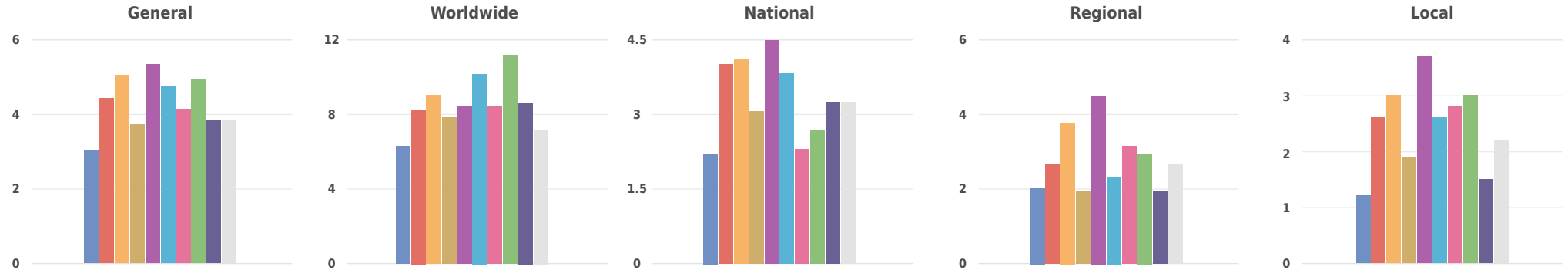
Worldwide **National** **Regional** **Local**

Average packet loss analysis (%)

The charts include a control group C (gray) to allow cross comparison.



July Data:



CenturyLink Cogent GTT Level 3 NTT Telia XO Zayo Hurricane Electric C

General:

- CenturyLink kept the leading position. It is followed by Level 3, XO and Hurricane Electric;
- A higher level of average loss has been registered for NTT, Zayo, and GTT;
- When comparing the August and July data, we did not notice any significant differences.

Worldwide:

- The lowest level of average packet loss has been registered by CenturyLink;
- The highest average packet loss among the analyzed carriers has been registered by Zayo followed by Telia and Hurricane Electric;
- When comparing August and July data, we notice that XO, Telia, and GTT have registered some improvement in their average packet loss compared to the previous month's values.

National:

- XO showed the best results in terms of packet loss followed by CenturyLink, Level 3 and Zayo;
- NTT registered a higher average packet loss when compared to other carriers;
- There have been registered certain differences in statistics at the national level when comparing August and July data. All Tier 1 carriers, except for GTT, showed worse results in terms of average packet loss.

Regional:

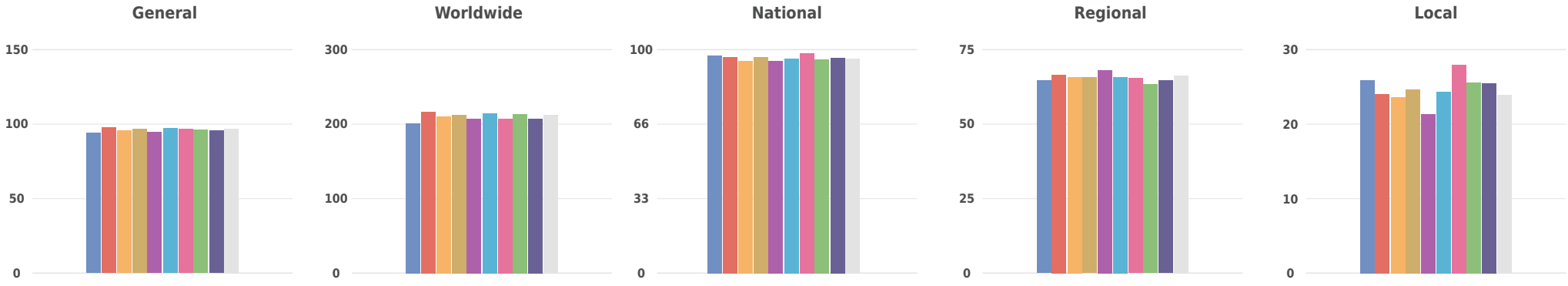
- Level 3 and Hurricane Electric kept the lowest average packet loss among the analyzed carriers. They are followed by CenturyLink and Telia;
- Cogent showed the same level of average packet loss as the control group;
- NTT and GTT registered a higher average packet loss compared to other carriers;
- We didn't notice significant differences in statistics at the regional level when comparing August and July data for all the providers.

Local:

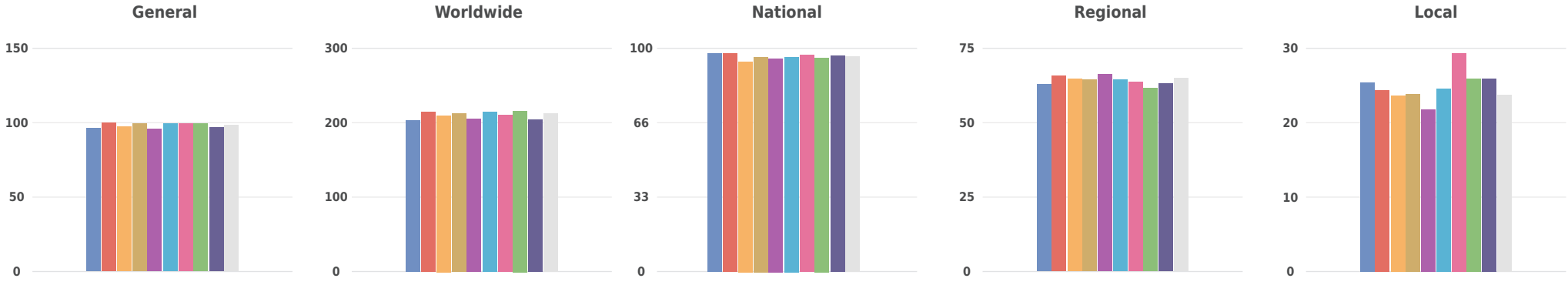
- CenturyLink kept the best result in terms of average packet loss among the analyzed carriers. It is closely followed by Hurricane Electric;
- The higher average packet loss has been registered by NTT and GTT.
- There are no significant differences in the distribution of average packet loss for the analyzed Tier 1 carriers when comparing August and July data, except for Zayo which improved its result.

Average latency analysis (ms)

The charts include a control group C (gray) to allow cross comparison.



July Data:



CenturyLink Cogent GTT Level 3 NTT Telia XO Zayo Hurricane Electric C

General:

- CenturyLink obtained the leading position in terms of average latency. It was followed by NTT, Hurricane Electric, and GTT;
- The highest average latency compared to the control group level has been registered by Cogent, followed by Telia.
- When comparing August and July data we notice that all Tier 1s showed better results in terms of latency, except for NTT and Hurricane Electric.

Worldwide:

- CenturyLink showed the best average latency result followed by XO and Hurricane Electric;
- Cogent and Telia registered the highest level of average latency among the analyzed carriers;
- Hurricane Electric and NTT showed higher average packet latency in August when compared to July results.

National:

- The lowest average packet latency was registered by GTT, followed by NTT and Zayo;
- XO, followed by CenturyLink showed the highest average packet latency;
- All carriers, except for GTT, Level 3, Telia and XO showed better results of average latency when compared to July data.

Regional:

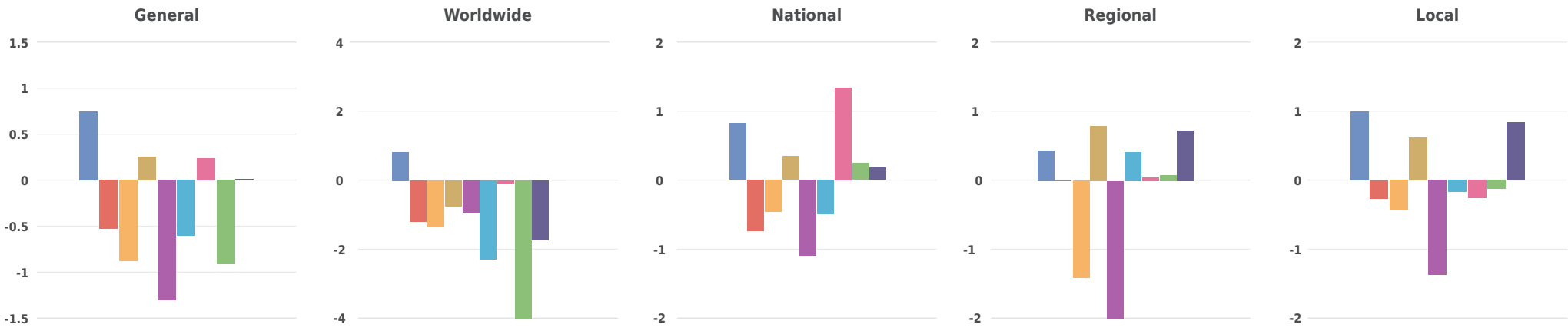
- Zayo kept the lowest average packet latency among the analyzed carriers;
- The higher average packet latency has been registered by NTT, followed by Cogent;
- All carriers, showed approximately the same results of average latency in August when compared to July data.

Local:

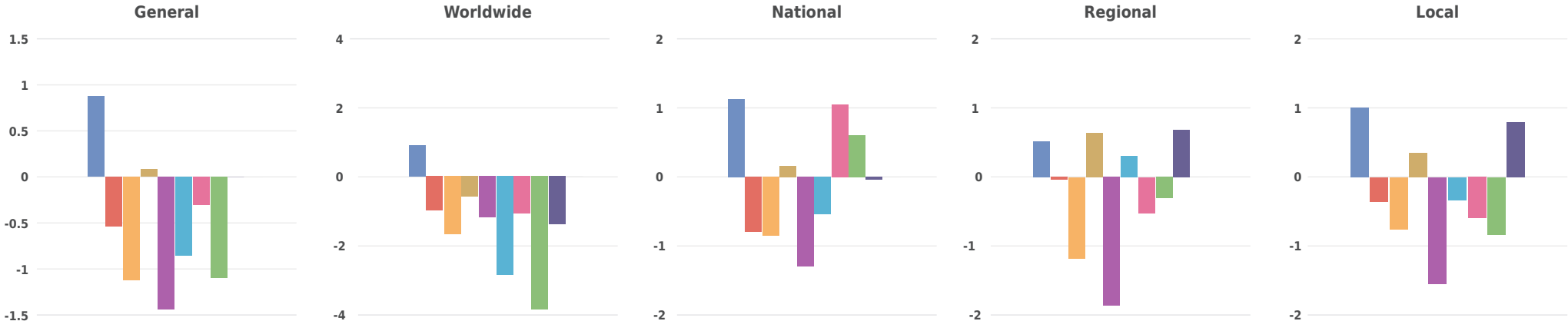
- All Tier 1s except for NTT and GTT showed worse results when compared to the control group level value (24.1 ms);
- XO registered a higher average latency than the control group level by ~4.1 ms, CenturyLink ~1.9 ms, Zayo ~1.7 ms, Hurricane Electric ~1.6 ms, Level 3 ~0.7 ms, Telia ~0.4 ms;
- We noticed an improvement in results for all carriers, except for Level 3 and CenturyLink when comparing August and July data.

Performance of each carrier in comparison to the control group

Better or worse loss by provider (%) (higher is better)



July Data:



CenturyLink Cogent GTT Level 3 NTT Telia XO Zayo Hurricane Electric

General:

- CenturyLink was the leader of the group with ~0.8% advantage over the control group level (4.0%), followed by Level 3 (~ 0.3%) and XO (~ 0.2%);
- NTT, Zayo, GTT, Telia, and Cogent showed worse results than the control group;
- When comparing August and July data, we notice that for all carriers, except for GTT, Level 3, Telia and XO, the average packet loss has increased by 0.1% - 0.3%

Worldwide:

- CenturyLink showed an advantage (~0.8%) in packet loss average over the control group level;
- When comparing August and July data we see that the average packet loss has decreased for XO by ~0.8%, for Telia by ~0.3%, for GTT by ~0.2%.

National:

- NTT showed the worst results in terms of Loss, exceeding the packet loss average of the control group by ~1,1% ;
- XO's result was the best. This carrier registered an advantage of 1.3% towards the control group packet loss average (3.7%);
- When comparing August and July data, we see a depreciation in results for CenturyLink by 0.2%.

Regional:

- Level 3 and Hurricane Electric showed an advantage (~ 0.8%) in packet loss average over the control group level;
- Cogent's result was the same as the control group level (2.7%);
- The highest packet loss average over the control group level has been registered by NTT and GTT. Their disadvantage being 2% and 1.4%, respectively.
- All carriers, except for Zayo and XO, showed an increase or kept the same value of the packet loss average in August when compared to July data.

Local:

- CenturyLink and Hurricane Electric showed the best results in terms of loss, their advantage over the control group was ~ 1.0%, followed by Level 3 with an advantage ~0.6%;
- NTT showed a higher average packet loss (1.4%) than the control group value (2.3%);
- All carriers, showed approximately the same or better results of average packet loss in August when compared to July data.

Better or worse latency by provider (ms) (higher is better)

General:

- CenturyLink obtained the leading position in terms of Latency with an advantage of ~2.5 ms over the control group level (98.4 ms). NTT, Hurricane Electric, and GTT were in the group of leaders as well. They registered better results than the control group by 1.7 ms and 1.1 ms respectively;
- Cogent, Telia and Level 3 showed worse results than the control group (98.4 ms) by 1.3ms, 0.6 ms, and 0.2 ms, respectively;
- When comparing August and July data we see that all Tier 1s, except for NTT and Hurricane Electric, improved their average packet latency.

Worldwide:

- All carriers, except for Cogent, Telia, Zayo and Level 3 registered better results in terms of Latency in comparison to the control group average (210.6 ms);
- The highest advantage over the control group was registered by CenturyLink (11.6 ms), followed by XO (5.3 ms), Hurricane Electric (4.8ms), NTT (4.7 ms), and GTT (2 ms);
- When comparing the obtained data to the previous month, we see that Hurricane Electric, NTT, and Cogent registered a higher average packet latency.

National:

- GTT's results were better than the control group (97.5 ms) by 1.5 ms, NTT's by 1.1 ms, Zayo by 0.5 ms;
- XO, CenturyLink, Cogent, Level 3, and Hurricane Electric showed higher average packet latency results compared to the control group level;
- All carriers except for Level 3 and XO registered better average packet latency when comparing August and July data.

Regional:

- Zayo, Hurricane Electric, and CenturyLink obtained the leading positions in terms of average packet latency showing better results than the average control group value (61.5 ms) by 2.8 ms and 1.6 ms, respectively;
- The higher average latency than the control group level has been registered by NTT ~1.63 ms, followed by Cogent ~ 0.2 ms;
- When comparing August and July data, we observed an improvement in results for the following carriers: Cogent, GTT and Level 3, while other Tier 1s worsened their results.

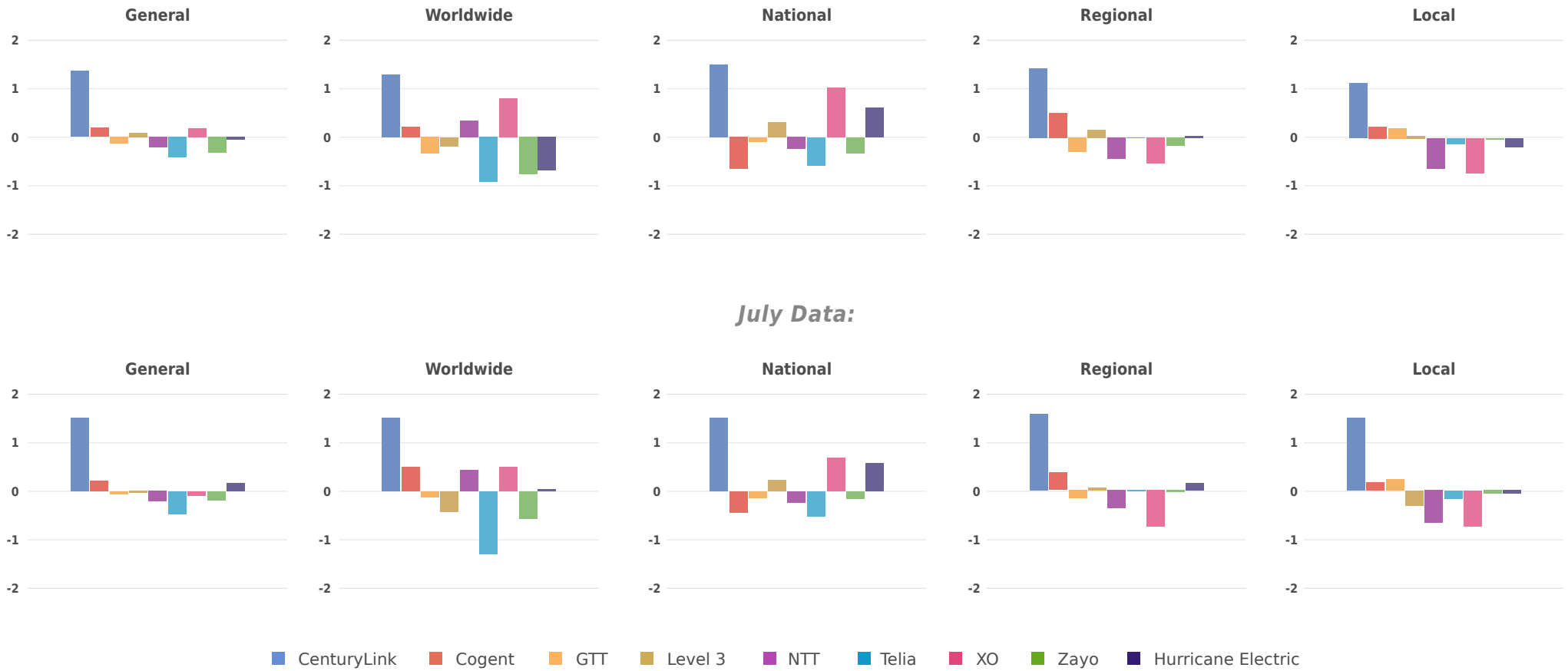
Local:

- All Tier 1s except for NTT and GTT showed better results when compared to the control group level value (24.1 ms);
- XO registered a higher average latency than the control group level by ~4.1 ms, CenturyLink ~1.9 ms, Zayo ~1.7 ms, Hurricane Electric ~1.6 ms, Level 3 ~0.7 ms, Telia ~0.4 ms;
- We noticed an improvement in results for all carriers, except for Level 3 and CenturyLink when comparing August and July data.

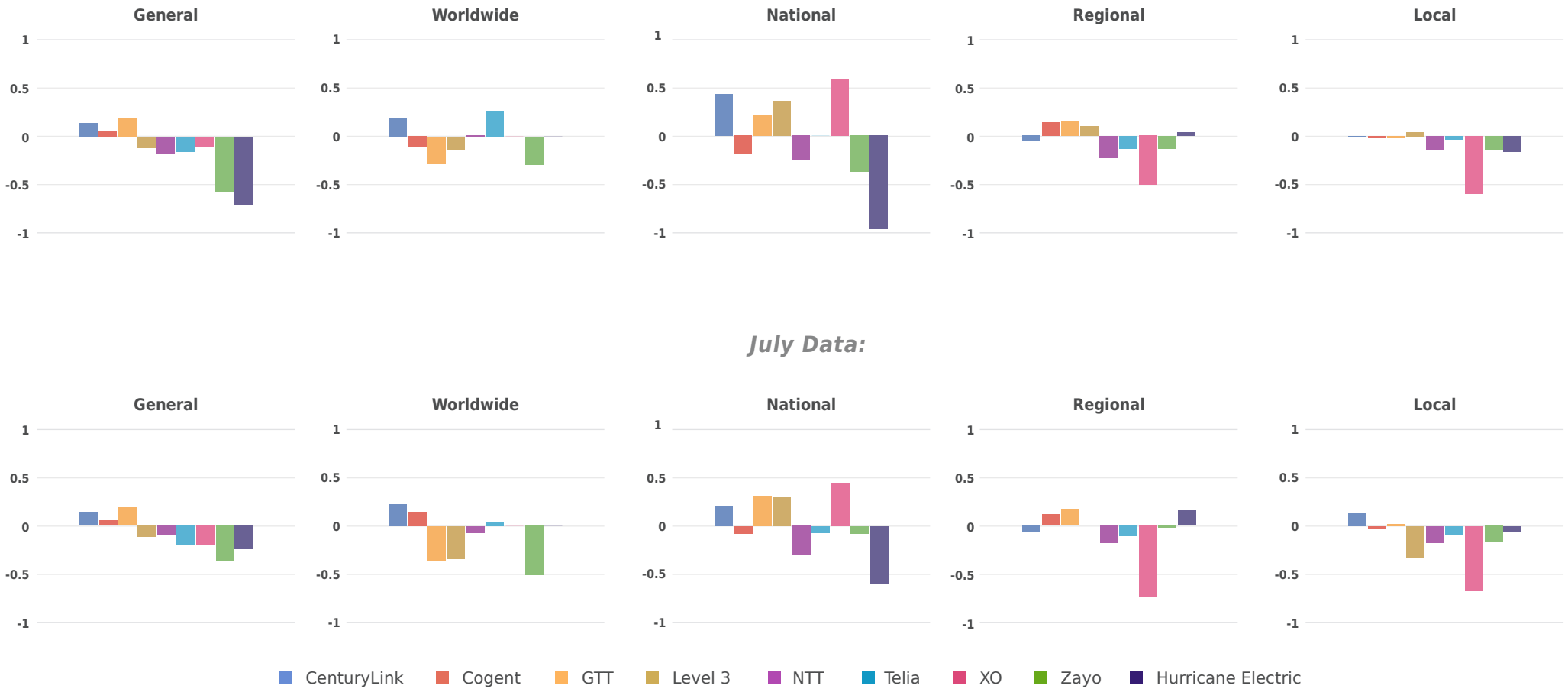
Packet Loss

Abnormally high losses were registered for a large number of datapoints. As was mentioned in previous reports we consider excessive an average above 4.5% packet loss. Given the fact that Tier 1 carriers are characterized by both low loss values for some networks and abnormally high losses for the other networks, the conclusion is that high loss values are not caused by the carriers themselves but rather are caused by the networks they service or the networks they peer with. Whether the true cause is poor design, over-provisioned links or deficiencies in the peering governance - this report cannot tell. What we can mention is that for many networks, whether permanently or sporadically, there is definitely an opportunity to improve things.

Average packet loss gain/loss by carrier (%) (all)



Average packet loss gain/loss by carrier (%) (up to 4,5% average)



July Data:

CenturyLink Cogent GTT Level 3 NTT Telia XO Zayo Hurricane Electric

General:

- In August, based on ALL data-points, CenturyLink, Cogent, XO, and Level 3 obtained better positions in terms of Loss for each packet in comparison with the control group. Their advantages being 1.3%, and 0.2%, respectively. After the cut off at the 4.5% control group level has been applied, the carrier rankings haven't modified significantly. CenturyLink and Cogent kept their advantage over the control group in terms of Loss for each packet. XO migrated to the group of carriers with weaker performance in terms of packet loss. GTT in its turn migrated to the group of leaders.

Worldwide:

- CenturyLink, XO, NTT and Cogent registered better results in terms of Loss for each packet than the control group. The cut off at the 4.5% control group level generated a change in the distribution of results. Cogent has moved to the group of carriers with higher loss values for each packet than the control group. XO, NTT, and Hurricane Electric showed the same results as the control group.

National:

- Based on ALL data-points, CenturyLink, XO, Hurricane Electric, and Level 3 showed lower loss values for each packet when compared with the control group level. Cogent's results exceeded the average packet loss of the control group by 0.7%, Telia's by 0.6%. After the cut off at the 4.5% control group level has been applied, Hurricane Electric migrated to the group of carriers with the higher individual packet loss, at the same time, GTT improved its result and moved to the group of leaders.

Regional:

- Based on ALL data points, CenturyLink showed a better loss for each packet compared to the control group (~1.3%). After the cut-off at the 4.5% control group level has been applied, the distribution of results has changed. CenturyLink lost its advantage and migrated into the group of losers. GTT, however, migrated to the group of carriers with lower packet loss.

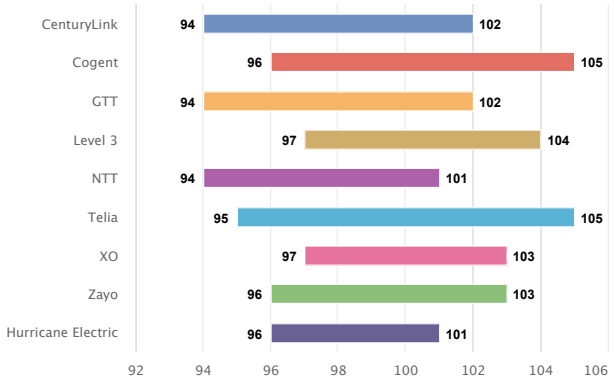
Local:

- Based on ALL data points, CenturyLink, Cogent and GTT have registered better results than the control group. After the cut-off at the 4.5% control group level has been applied, the distribution of per-packet loss value has significantly changed.

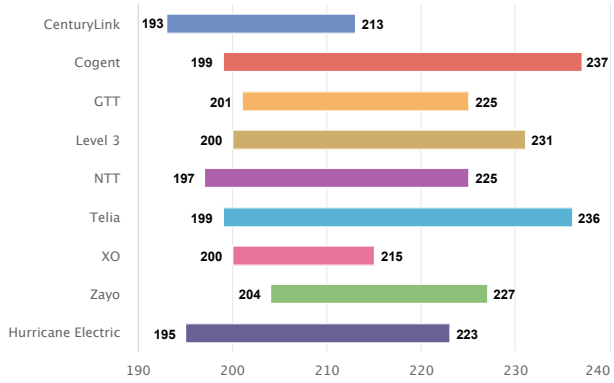
Latency

Tier 1 Carriers have been mostly present within the following latency diapazons (ms):

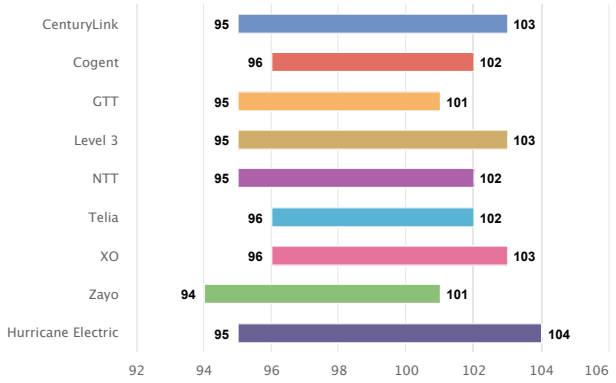
General



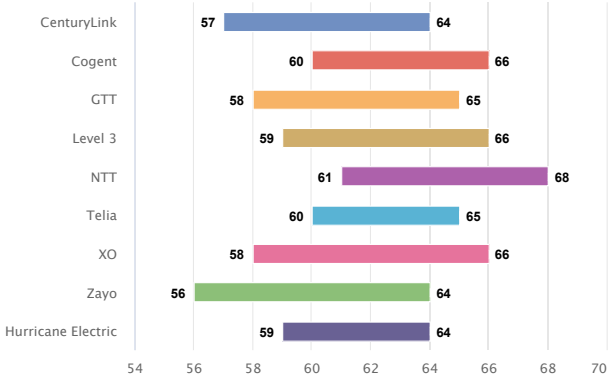
Worldwide



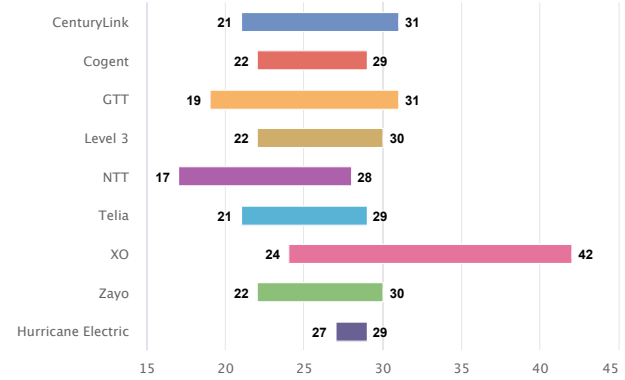
National



Regional

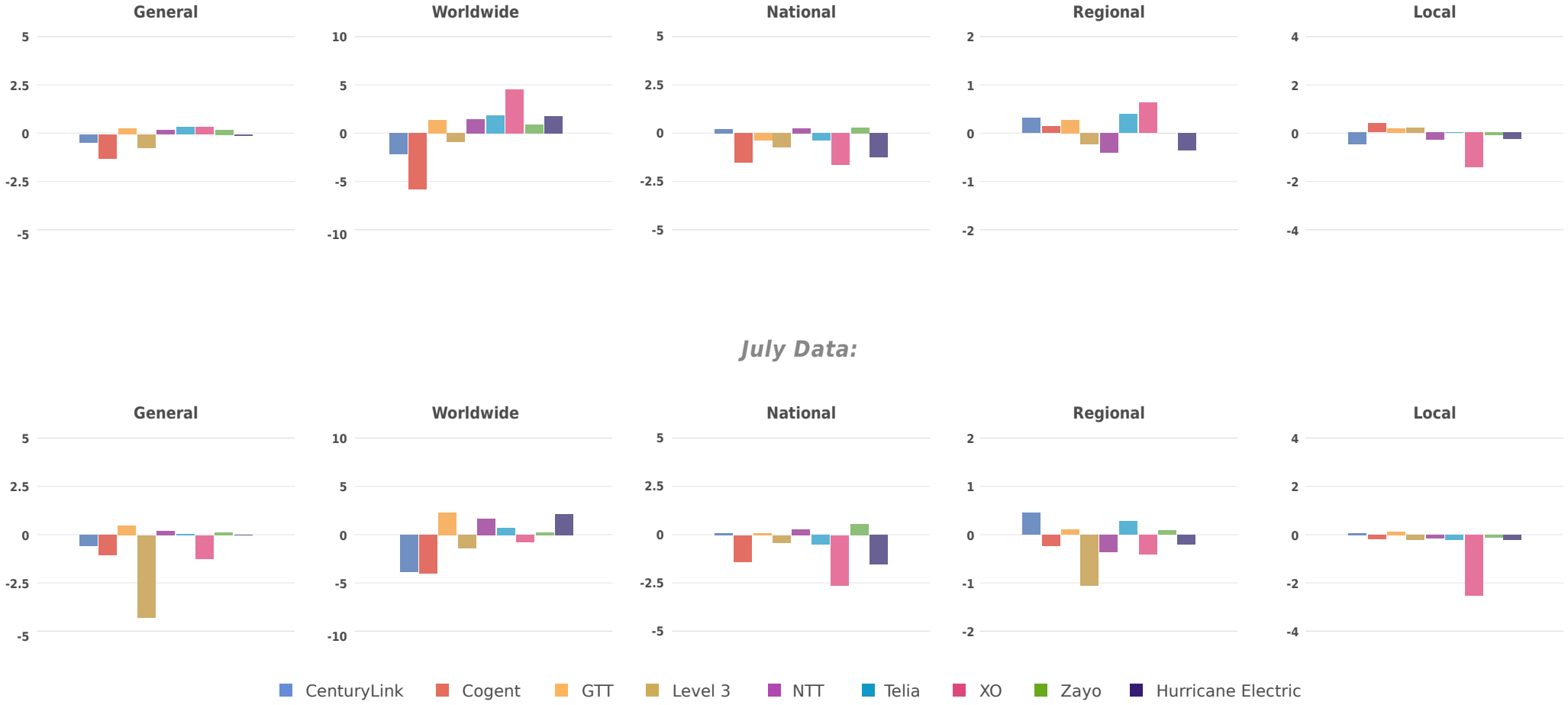


Local



Average latency gain/loss by carrier (ms) (higher is better)

The differences in latency from the control group level shown below are averaged with the expectation that better or worse performance will cancel out if the differences are caused by the measurement noise.



General:

- XO, Telia, GTT, Zayo, and NTT showed better latency results for each packet which transits them than the control group. The worst result showed Cogent which added about 1.5 ms to each packet's RTT in comparison to the control group.

Worldwide:

- All carriers, with the exception for Cogent, CenturyLink and Level 3 showed better latency for each packet when compared to the control group. Cogent added ~ 5.5 ms to the latency for each packet, followed by CenturyLink which added ~ 2.0 ms and Level 3 ~ 0.8 ms.

National:

- All Tier 1 carriers showed worse latency results for each packet when compared to the control group except for Zayo, NTT, and CenturyLink ;
- The worst results were registered by XO (added 1.77 ms) followed by Cogent (added 1.63 ms).

Regional:

- XO, Telia, CenturyLink, GTT, Cogent and Zayo showed better or the same RTT for each packet in comparison to the control group by ~0.6 ms, ~0.4 ms, ~ 0.3 ms, ~ 0.1ms respectively.
- The worst results showed NTT, Hurricane Electric and Level 3.

Local:

- All carriers, except for Cogent, Level 3, GTT and Telia registered worse average latency for each packet than the control group. The worst result was registered by XO.

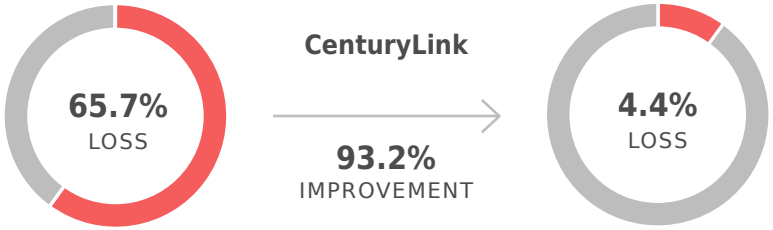
Packet Loss and Latency spread charts highlighting individual Tier 1 carriers results are available upon request.

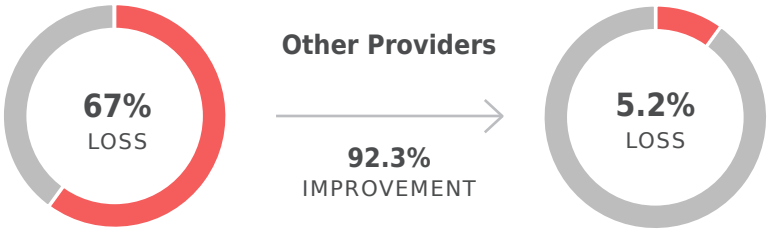
IRP Improvement

The following level of analysis highlights the performance of our Intelligent Routing Platform for Noction customers at the general level. The best average packet loss for August 2019 was registered by CenturyLink.

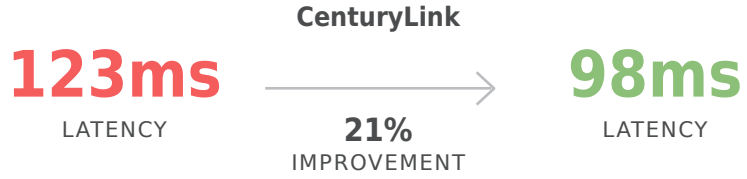
The presented data is based on the aggregated statistics of our customers where one of the providers is CenturyLink.

In 55% of all registered cases when IRP improved outbound traffic by loss, CenturyLink was selected as the best route. When CenturyLink was selected as the best route among other providers, the average packet loss value was improved by ~93 %.

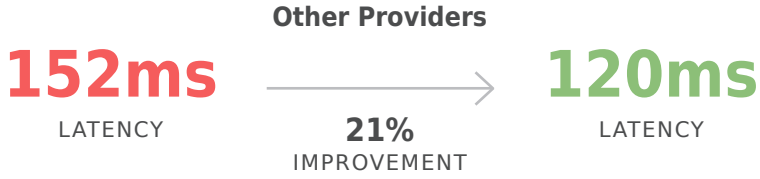


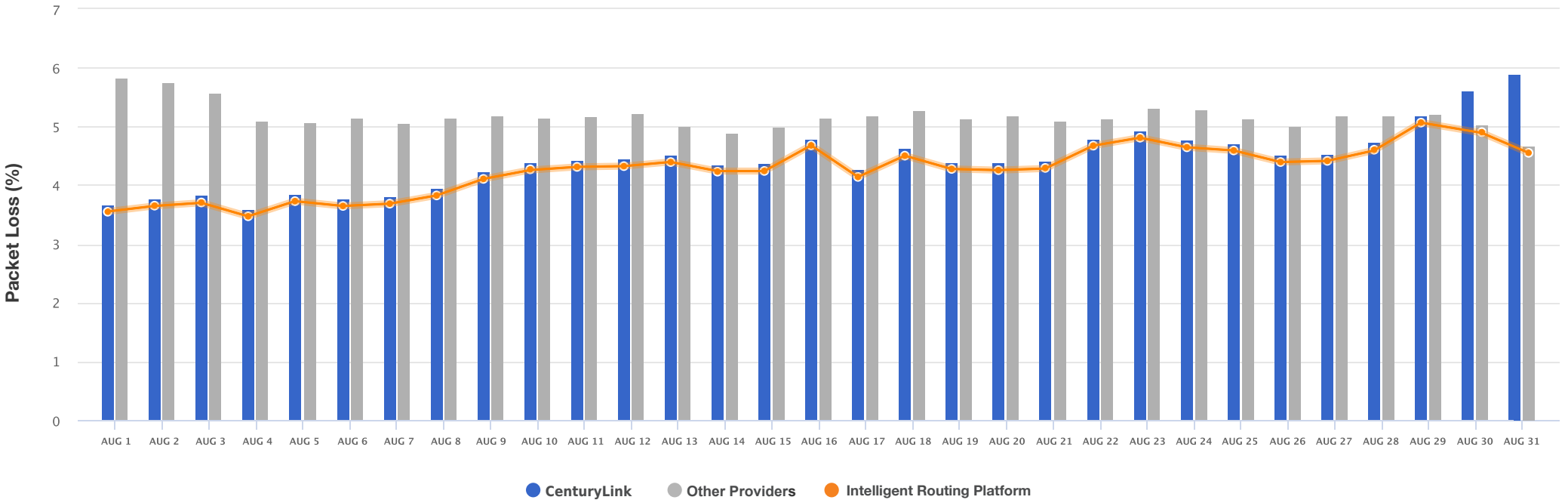


When Latency was the cause of improvement, CenturyLink got selected by IRP as the best route in 74% of cases. Average latency in such cases improved by ~ 21% (a drop from 123 ms to 98 ms).



In the rest of the cases, when other providers were selected by IRP, the latency improvement level was at ~ 21 % (a drop from 152 ms to 120 ms).





The chart above represents a detailed view of the daily average packet loss values as well as the Intelligent Routing Platform performance when optimizing traffic for our customers.

This report was brought to you by Noction.

Noction Intelligent Routing Platform enables enterprises and service providers to maximize end-to-end network performance and safely reduce infrastructure costs. The platform evaluates critical network performance metrics in real-time and responds quickly by automatically rerouting traffic through a better path to avoid outages and congestion.

Request a free trial today and see how IRP can boost your network performance.

Start a Free Trial