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April 13, 2017

*Via Hand Delivery and ECFS*

Ms. Marlene H. Dortch  
Secretary  
Federal Communications Commission  
445 Twelfth Street, SW  
Washington, D.C. 20554

*Re: CenturyLink, Inc. and Level 3 Communications, Inc. Consolidated  
Applications for Consent to the Transfer of Control of Licenses and  
Authorizations (WC Docket No. 16-403)*

Dear Ms. Dortch:

CenturyLink, Inc. (“CenturyLink”) and Level 3 Communications, Inc. (“Level 3,” and together with CenturyLink, “Applicants”), by and through their respective counsel, hereby respectfully provide the attached Further Joint Response, which responds to Request Numbers 2 and 4 set forth in the Commission’s Information Request dated March 30, 2017, in the above-referenced docket. Applicants responded to Request Number 3 in their Initial Joint Response filed in this docket on April 7, 2017,<sup>1</sup> and CenturyLink is concurrently filing a separate response to Request Numbers 1(a), 1(b), 1(c), and 5. Level 3 is concurrently filing a separate response to Request Numbers 1(a), 1(b), 1(d), 4, and 5.

Certain of the documents supporting Applicants’ response to Request Numbers 2 and 4 are Highly Confidential. Consistent with the instructions in the Protective Order in this docket, these Highly Confidential documents are being hand-filed, and copies are being provided to Commission staff pursuant to the instructions set forth in the Commission’s Information Request. Applicants’ narrative response does not contain proprietary and non-public information and is being both hand-filed and filed electronically in the Commission’s Electronic Comment Filing System.

Redacted submissions are marked “REDACTED — FOR PUBLIC INSPECTION” and are being filed electronically in the Commission’s Electronic Comment Filing System. Unredacted Highly Confidential submissions marked “HIGHLY CONFIDENTIAL INFORMATION — SUBJECT TO PROTECTIVE ORDER IN WC DOCKET NO. 16-403 BEFORE THE FEDERAL COMMUNICATIONS COMMISSION” are being delivered to the Secretary. Copies of the unredacted Highly Confidential submissions will be made available to third parties pursuant to the terms of the Protective Order.

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<sup>1</sup> Initial Joint Response of CenturyLink, Inc. and Level 3 Communications, Inc. to Information and Document Requests, WC Docket No. 16-403 (filed April 7, 2017).

**REDACTED — FOR PUBLIC INSPECTION**

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Page 2

Any questions concerning this submission should be addressed to the undersigned and to counsel for Level 3, designated below.

Respectfully submitted,

*/s/ Michael Beder*

Michael Beder  
*Counsel for CenturyLink*

**Attachments**

cc: Thomas Jones, Willkie Farr & Gallagher LLP  
Mia Guizzetti Hayes, Willkie Farr & Gallagher LLP  
*Counsel for Level 3*

**Before the  
FEDERAL COMMUNICATIONS COMMISSION  
Washington, DC 20554**

	)	
In the Matter of	)	
	)	
CenturyLink, Inc.	)	
	)	
and	)	WC Docket No. 16-403
	)	
Level 3 Communications, Inc.	)	
	)	
Consolidated Applications for Consent to	)	
Transfer Control of Domestic and International	)	
Authorizations Pursuant to Section 214 of the	)	
Communications Act of 1934, As Amended	)	
	)	

**FURTHER JOINT RESPONSE OF  
CENTURYLINK, INC. AND LEVEL 3 COMMUNICATIONS, INC.  
TO INFORMATION AND DOCUMENT REQUESTS**

CenturyLink, Inc. (“CenturyLink”) and Level 3 Communications, Inc. (“Level 3,” and together with CenturyLink, the “Applicants”) hereby provide this Further Joint Response to the Wireline Competition Bureau’s Information and Document Requests issued in the above-referenced docket on March 30, 2017, to the Applicants.<sup>1</sup> This Further Joint Response, and the documents produced herewith,<sup>2</sup> address common issues applicable to both of the Applicants.

CenturyLink and Level 3 are concurrently filing separate responses under separate cover

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<sup>1</sup> *Applications Filed for the Transfer of Control of Level 3 Communications, Inc. to CenturyLink, Inc.*, Letter from Madeleine Findley, Wireline Competition Bureau, to Thomas Jones *et al.*, Counsel for Level 3 Communications, Inc., and Yaron Dori *et al.*, Counsel for CenturyLink, Inc., WC Docket No. 16-403, DA 17-296 (Mar. 30, 2017) (“RFI”). Unless indicated otherwise, this Further Joint Response incorporates by reference the defined terms in Section I of the Appendix to the Attachment to the RFI. The Applicants filed their Initial Joint Response to Request Number 3 on April 7, 2017.

<sup>2</sup> An index of the documents produced with this Further Joint Response is provided as Attachment A hereto.

regarding information and documents specific to each party, respectively. In addition, the Applicants responded to Request Number 3 in their Initial Joint Response filed in this docket on April 7, 2017.<sup>3</sup>

## REQUESTS AND RESPONSES

1. *For each of the following services -- business Internet Access service, BDS, lit fiber services, dark fiber services, long-haul fiber, and metro fiber:*

- a. *Provide for each Applicant a description of the service, a description of each customer class and geographic areas for which sales reports are compiled for that service, the average price charged for each service, and total aggregate revenues for each service (broken down for each quarter beginning January 1, 2015 by the geographic areas and customer classes where the Applicants compete);*

Please see CenturyLink's and Level 3's separate responses filed concurrently herewith.

- b. *Describe, and provide documents sufficient to show, the extent to which the Applicants compete with each other in the provision of each service.*

Please see CenturyLink's and Level 3's separate responses filed concurrently herewith.

- c. *Describe and provide documents sufficient to show the extent to which the Transaction will affect the Applicants' plans and offerings for each service, both within and outside of CenturyLink's incumbent local exchange carrier (LEC) footprint, including any steps the combined company will take post-Transaction to change existing service offers and/or terms and conditions to business consumers both inside of and outside of CenturyLink's incumbent LEC footprint, including customers located on Tribal lands;*

Please see CenturyLink's and Level 3's separate responses filed concurrently herewith.

- d. *Describe and provide documents sufficient to show the extent to which Level 3 has altered its pricing strategies for BDS services, lit fiber services, dark fiber services, longhaul fiber, and metro fiber since January 1, 2016.*

Please see Level 3's separate response filed concurrently herewith.

2. *Provide the competitive analysis identified on page B-18 of the Applicants' Public Interest Statement and on page 2 of the December 19, 2016 Supplement regarding the long-haul fiber and metro fiber markets served by the Applicants. Explain all assumptions used to produce the analysis and provide the underlying documents and spreadsheets used for this analysis.*

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<sup>3</sup> Initial Joint Response of CenturyLink, Inc. and Level 3 Communications, Inc. to Information and Document Requests, WC Docket No. 16-403 (filed April 7, 2017) ("Initial Joint Response").

The Highly Confidential long-haul maps and accompanying analysis document submitted with this response<sup>4</sup> at Bates CTLLVLT-000017–CTLLVLT-000071 demonstrate that each of the 52 overlapping long-haul route segments served by CenturyLink and Level 3 would have at least seven fiber providers offering lit services post-merger. After the Transaction, on 50 of these routes at least three providers with the ability to sell dark fiber would remain, and on the remaining two routes (Atlanta, GA, to Nashville, TN; and Jackson to Seminary, MS) at least two such providers would remain.<sup>5</sup>

With respect to how this competitive analysis was prepared, the Applicants first identified the long-haul routes that include fiber that either CenturyLink and Level 3 owns or has an indefeasible right of use (“IRU”) to employ, using endpoint locations identified by the Core-Based Statistical Area (“CBSA”) in which the endpoint was located.<sup>6</sup> The Applicants then overlaid their respective routes on top of one another to create a map of common routes.<sup>7</sup> These common routes were then overlaid onto spatially referenced network maps extracted from the

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<sup>4</sup> In addition to assessing the effect that the Transaction will have on competition along the Applicants’ overlapping long-haul routes, the accompanying analysis document discusses the state of competition for long-haul services in the United States and Canada more generally, using information drawn from a report produced by the telecommunications market research company TeleGeography. [Bates CTLLVLT-000072– CTLLVLT-000081]

<sup>5</sup> Request Number 2 references specific pages of prior submissions by the Applicants that discuss the competitive analysis with respect to long-haul routes and, separately, with respect to competition to serve buildings within metro fiber markets. Further information on that building analysis has been provided in response to Request Number 3. *See* Initial Joint Response. Accordingly, this response to Request Number 2 focuses on the competitive analysis with respect to long-haul routes.

<sup>6</sup> CBSAs are used by the Office of Management and Budget to provide a nationally consistent set of geographic entities for the United States and Puerto Rico for use in tabulating and presenting statistical data. For any endpoint location that was within a CBSA, the endpoint was assumed to be at the center of the CBSA. For those fiber routes whose endpoints were outside of a CBSA, the endpoints were identified by the names of the cities in which the endpoints were located.

<sup>7</sup> Routes were considered overlapping if the endpoints on a route from one company matched the endpoints on the route of the other.

websites of AT&T, Charter, Comcast, Telepak, Verizon, and Zayo, which showed that all of the common routes would be served by at least one of these competitive providers, in addition to the combined CenturyLink-Level 3 entity, post-merger. This analysis showed that all but three of the overlapping CenturyLink-Level 3 long-haul fiber routes are presently served by one or more of AT&T, Comcast, and/or Verizon, and the three short routes that remain — Boise, ID, to Portland, OR; Jackson to Seminary, MS; and Birmingham to Montgomery, AL — are served by at least one other provider.<sup>8</sup>

After submitting their Application, the Applicants undertook a further review of their common long-haul routes that incorporated additional competitive fiber provider data and distinguished among the provision of lit versus dark fiber. Specifically, the Applicants incorporated data and network maps from a wider array of competitive fiber providers than was used in their initial analysis, as well as information from Telecom Ramblings, to identify both the presence of additional competitors along their 52 overlapping long-haul routes and whether such providers provide lit and/or dark services.<sup>9</sup> This research allowed the Applicants to produce the 52 long-haul route maps and accompanying analysis document submitted with this response at Bates CTLLVLT-000017–CTLLVLT-000071.

For further discussion on competition in the sale of long-haul dark fiber, please see the

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<sup>8</sup> The Boise-to-Portland route is served by Zayo, the Jackson-to-Seminary route is served by Telepak, and the Birmingham-to-Montgomery route is served by Charter. We note also that the route identified as Boise, ID to Portland, OR in the Public Interest Statement does not appear in the set of 52 long-haul maps produced in connection with the Applicants' response to Request Number 2. [Bates CTLLVLT-000017–CTLLVLT-000068] This is because Boise is included within the Portland, OR to Salt Lake City, NV route. [Bates number CTLLVLT-000054]

<sup>9</sup> As reflected in each map, the Applicants also gathered and assessed information on where Level 3 built fiber that it later sold (most commonly as an IRU) to the provider, the number of fibers obtained by the providers from Level 3, the number of those fibers the provider currently is using, the number of fibers the provider itself built and has retained, and the number of fibers the provider currently is and is not using.

attached Highly Confidential white paper at Bates CTLLVLT-000004–CTLLVLT-000016 and its accompanying attachments at Bates numbers CTL-00009432–CTL-00009450.

- 3. Explain Applicants' competitive analysis identified on pages 3-9 of their February 7, 2017 Joint Reply Comments in this proceeding regarding the provision of BDS to locations capable of being served by the Applicants' fiber facilities both within CenturyLink's region and outside of CenturyLink's region (include any subsequent changes or amendments to the competitive analysis resulting from Applicants' "continuing to investigate and refine their building assessment" as noted on page 7 and a description of the procedures used in any such further investigation and refinement). The explanation should include: all assumptions used to produce the analysis, including whether the definition of BDS included or excluded certain technologies and whether the definition of BDS required or considered the option of service level agreements; Applicants' definition of an overlap building (including whether the overlap determination was based on address match or distance proximity); and the underlying data and documents used for the competitive analysis, sufficient to enable the Commission to replicate the Applicants' competitive analysis. Rather than providing the underlying data for Applicants' competitive analysis, Applicants instead can provide the data requested in Templates A, B, C, and D attached hereto.*

Please see the Applicants' Initial Joint Response filed in this docket on April 7, 2017.

- 4. Applicants state that they currently "compete against some of the largest Tier 1 backbone providers in the provision of transit services" and that "the combination of CenturyLink and Level 3 will have little impact on the overall level of competition for IP transit services." (Public Interest Statement at B- 16 and B-17). Describe, and provide and identify supporting documents showing, each Applicant's position, rank, and competitive strategy in the North American Transit Services market, and how each Applicant compares to competing Transit Service providers in this market. For each Applicant, submit documents created after January 1, 2015 sufficient to show each Applicant's plans relating to Transit Services, including all documents discussing how Level 3's Transit Service business will be merged into CenturyLink's Transit Service business.*

Today, CenturyLink places fifteenth in the CAIDA rankings and thirteenth in the most recent Dyn rankings of global Internet transit providers.<sup>10</sup> Level 3 places first in both the Dyn and CAIDA rankings. In the narrower Dyn North America regional rankings, CenturyLink

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<sup>10</sup> See CENTER FOR APPLIED INTERNET DATA ANALYSIS, *AS Rank: AS Ranking*, <http://as-rank.caida.org/?mode0=as-ranking&n=20&ranksort=1> [Bates CTLLVLT-000111–CTLLVLT-000116]; DYN, *A Baker's Dozen, 2016 Edition*, <http://dyn.com/blog/a-bakers-dozen-2016-edition/> [Bates CTLLVLT-000117– CTLLVLT-000128].

presently places seventh, while Level 3 places first.<sup>11</sup>

Following the Transaction, the combined company will face strong competition from firms that provide transit services in the U.S. using Internet backbones with a national (at least) reach, including: Cogent; GTT; Hurricane Electric; NTT; Tata; TeliaSonera; and Verizon/XO. Other large Internet providers, such as AT&T, Comcast, and Charter, are also well positioned to compete aggressively in the transit marketplace. Moreover, many owners of IP networks with significant scale do not compete in the provision of transit services but could do so without incurring significant expenses if transit prices were to rise. These network owners include firms such as Apple and Google that have built IP networks to transport content to ISPs serving end-users but historically have not sold transit services.

A presentation describing the Applicants' network integration plans with respect to their Internet backbones (as well as MPLS backbones), is produced herewith at Bates CTLLVLT-000084–CTLLVLT-000110.

5. *Provide a detailed explanation with supporting documentation and documents sufficient to show the basis for, and derivation of, Applicants' claimed public interest benefits, efficiencies, and synergies resulting from the proposed Transaction (as set forth in pages B-4 through B-14 of the Public Interest Statement), and for each provide:*
  - a. *A description and the underlying assumptions of the steps Applicants will take to achieve the claimed cost savings, efficiencies, synergies, and other benefits; the costs Applicants will incur to achieve these effects; the risks Applicants face in realizing these effects; the breakdown between savings in fixed costs and marginal costs; and the time required to achieve these effects (including whether they are primarily short-term or long-term); and*
  - b. *Applicants' plans to pass through any cost savings from the Transaction to consumers and the extent to which Applicants have passed through past cost savings to consumers from prior transactions (including the magnitude and time horizon for these pass-through cost savings to consumers).*

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<sup>11</sup> Dyn, *Fourth Quarter 2016 North America Rankings*, RENESYS RANKINGS TABLE 2012-2016 (Jan. 4, 2017) [Bates CTLLVLT-000082– CTLLVLT-000083].

Please see CenturyLink's and Level 3's separate responses filed concurrently herewith.

\* \* \*

Respectfully submitted,

**LEVEL 3 COMMUNICATIONS, INC.**

**CENTURYLINK, INC.**

/s/

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Dated: April 13, 2017

**RESPONSE OF CENTURYLINK, INC. AND LEVEL 3 COMMUNICATIONS, INC.  
TO INFORMATION AND DOCUMENT REQUESTS**

**APRIL 13, 2017**

**ATTACHMENT A: DOCUMENT INDEX**

<b>Bates</b>	<b>Title</b>	<b>Date</b>	<b>Custodian / Source</b>	<b>Responsive to Requests</b>	<b>Confidentiality</b>	<b>Produced to DOJ</b>
CTLLVLT-000004 to CTLLVLT-000016	Parties' Submission to the U.S. Department of Justice on the Effects of the Combination of CenturyLink and Level 3 on Competition for Inter-City Dark Fiber	April 12, 2017	CenturyLink and Level 3	2	Highly Confidential	Y
CTLLVLT-000017 to CTLLVLT-000068	LHCompetitiveRoutes 04072017	April 7, 2017	CenturyLink	2	Highly Confidential	N
CTLLVLT-000069 to CTLLVLT-000071	Long Haul Analysis	April 12, 2017	CenturyLink	2	Highly Confidential	N
CTLLVLT-000072 to CTLLVLT-000081	Regional Analysis: United States & Canada	2016	TeleGeography	2	Highly Confidential	Y
CTLLVLT-000082 to CTLLVLT-000083	Renesys Ranking Table	January 4, 2017	Dyn (formerly Renesys)	4	Highly Confidential	N

<b>Bates</b>	<b>Title</b>	<b>Date</b>	<b>Custodian / Source</b>	<b>Responsive to Requests</b>	<b>Confidentiality</b>	<b>Produced to DOJ</b>
CTLLVLT-000084 to CTLLVLT-000110	IP/MPLS/Metro Strategy	2017	CenturyLink and Level 3	4	Highly Confidential	N
CTLLVLT-000111 to CTLLVLT-000113	2015 CAIDA AS Rank	last accessed April 12, 2017	Center for Applied Internet Data Statistics	4	Public	N
CTLLVLT-000114 to CTLLVLT-000116	2016 CAIDA AS Rank	last accessed April 12, 2017	Center for Applied Internet Data Statistics	4	Public	N
CTLLVLT-000117 to CTLLVLT-000122	A Baker's Dozen, 2015 Edition	last accessed April 12, 2017	Dyn	4	Public	N
CTLLVLT-000123 to CTLLVLT-000128	A Baker's Dozen, 2016 Edition	last accessed April 12, 2017	Dyn	4	Public	N
CTL-00009432 to CTL-00009445	Dark Fiber is Shining Bright: What is Driving its Resurgence?	March 2016	Frost & Sullivan	2	Highly Confidential	Y
CTL-00009446 to CTL-00009450	OD5025 — Dark Fiber Network Operators	January 2017	IBISWorld	2	Highly Confidential	Y

**REDACTED — FOR PUBLIC INSPECTION**

Documents CTLLVLT-000004 through  
CTLLVLT-000110 are Highly Confidential in their  
entirety.

**REDACTED — FOR PUBLIC INSPECTION**

Documents CTL-00009432 through CTL-00009450 are  
Highly Confidential in their entirety.



# AS Rank: AS Ranking

This page presents the BETA version of AS Rank, CAIDA's ranking of [Autonomous Systems \(AS\)](#) (which approximately map to Internet Service Providers) and organizations (Orgs) (which are a collection of one or more ASes). This ranking is derived from topological data collected by CAIDA's [Archipelago Measurement Infrastructure](#) and [Border Gateway Protocol \(BGP\)](#) routing data collected by the [Route Views Project](#) and [RIPE NCC](#).

ASes and Orgs are ranked by their [customer cone size](#), which is the number of their direct and indirect customers. Note: We do not have data to rank ASes (ISPs) by traffic, revenue, users, or any other non-topological metric.

Download Data: [AS Relationship Data](#) [AS Organization](#) [AS Classification](#)

Feedback: [asrank-feedback@caida.org](mailto:asrank-feedback@caida.org)

[AS Ranking](#) [Org Ranking](#) [Information for a single AS](#) [Information for a single Org](#) [Background](#) [Data Sources](#) [Help](#)

[AS Ranking Help](#)

The top ASes ranked by customer cone size are displayed below.

Dataset: 2015-07-01 IPv4

For information about a specific AS, enter its AS name, its AS number, or the name of the Org of which the AS is a member.

Look up an AS by number or name

Table shows 20 of 51171 ASes, sorted by number of ASes in customer cone update view

AS rank	AS number	AS name	Org name	AS Type(s)	customer cone						AS transit degree
					Number of			Percentages of all			
					ASes	IPv4 Prefixes	IPv4 Addresses	ASes	IPv4 Prefixes	IPv4 Addresses	
1	3356	LEVEL3	Level 3 Communications, Inc.	Tr/Ac	24,553	190,138	715,498,496	47%	32%	33%	4260
2	174	COGENT-174	Cogent Communications	Tr/Ac	17,891	134,631	648,411,904	34%	22%	30%	4813
3	3257	TINET-BACK...	Tinet Spa	Tr/Ac	16,963	152,116	593,284,864	33%	25%	27%	1271
4	1299	TELIANET	TeliaSonera AB	Tr/Ac	15,743	133,184	482,770,944	30%	22%	22%	1095
5	2914	NTT-COMMUN...	NTT America, Inc.	Tr/Ac	13,046	117,297	511,799,040	25%	20%	23%	1279
6	6453	AS6453	TATA COMMUNICATIONS (AMERICA) INC	Tr/Ac	9,607	108,546	447,639,040	18%	18%	20%	660
7	6762	SEABONE-NET	TELECOM ITALIA SPARKLE S.p.A.	Tr/Ac	8,646	82,712	238,719,232	16%	14%	11%	489
8	6939	HURRICANE	Hurricane Electric, Inc.	Tr/Ac	8,048	74,594	305,295,872	15%	12%	14%	3958
9	2828	XO-AS15	XO Communications	Tr/Ac	5,866	49,541	249,494,784	11%	8.5%	11%	1105
10	3549	LVLT-3549	Level 3 Communications, Inc.	Tr/Ac	5,534	48,618	89,031,424	10%	8.3%	4.1%	1183
11	1273	CW	Cable and Wireless Worldwide plc	Tr/Ac	4,469	34,978	147,194,624	8.7%	6.0%	6.9%	330
12	3491	BTN-ASN	Beyond The Network America, Inc.	Tr/Ac	4,196	50,952	184,550,656	8.2%	8.7%	8.6%	558
13	6461	ABOVENET	Abovenet Communications, Inc	Tr/Ac	3,858	26,306	106,985,984	7.5%	4.5%	5.0%	1433
14	3320	DTAG	Deutsche Telekom AG	Tr/Ac	3,527	25,968	228,420,864	6.9%	4.4%	10%	535
15	20485	TRANSTELECOM	Closed Joint Stock Company TransTeleCom	Tr/Ac	3,323	18,086	28,348,672	6.5%	3.1%	1.3%	1894
16	9002	RETN-AS	RETN Limited	Tr/Ac	3,271	13,706	21,806,080	6.4%	2.3%	1.0%	1864
17	7018	ATT-INTERNET4	AT&T Services, Inc.	Tr/Ac	3,189	27,807	254,971,136	6.2%	4.7%	11%	2269

18	701	UUNET	MCI Communications Services, Inc. d/b/a Verizon Business	Tr/Ac	3,058	30,206	352,277,248	6.0%	5.2%	16%	1570
19	209	CENTURYLIN...	Qwest Communications Company, LLC	Tr/Ac	2,934	31,424	231,474,688	5.7%	5.4%	10%	1580
20	1239	SPRINTLINK	Sprint	Tr/Ac	2,923	35,281	329,687,040	5.7%	6.0%	15%	594

#### data sources

<b>geolocation</b>	BGP	2010.08.01, 2010.08.02, 2010.08.03, 2010.08.04, 2010.08.05	routeviews	eqix, isc, kixp, linx, routeviews2
	database	2010.08.30	netacuity	
<b>organization</b>	whois	0000.00.00, 2012.06.29, 2013.10.01, 2014.01.01	JPNIC, KRNIC, LACNIC	AFRINIC, APNIC, ARIN, LACNIC, RIPE
<b>topology</b>	BGP	2013.11.01, 2013.11.02, 2013.11.03, 2013.11.04, 2013.11.05	ripe	rrc00, rrc01, rrc03, rrc04, rrc05, rrc06, rrc07, rrc10, rrc11, rrc12, rrc13, rrc14, rrc15
		2014.03.01, 2014.03.02, 2014.03.03	routeviews	eqix, isc, jinx, kixp, linx, routeviews, routeviews2, saoppaulo, sydney, telxatl, wide
		2014.03.04, 2014.03.05	ripe	rrc00, rrc01, rrc03, rrc04, rrc05, rrc06, rrc07, rrc10, rrc11, rrc12, rrc13, rrc14, rrc15
			routeviews	eqix, isc, jinx, linx, routeviews, routeviews2, routeviews3, saoppaulo, sydney, telxatl, wide
		2014.09.01, 2014.09.02, 2014.09.03, 2014.09.04, 2014.09.05	ripe	rrc00, rrc01, rrc03, rrc04, rrc05, rrc06, rrc07, rrc10, rrc11, rrc12, rrc13, rrc14, rrc15
			routeviews	eqix, isc, jinx, kixp, linx, routeviews, routeviews2, routeviews3, routeviews6, saopaulo, sydney, telxatl, wide
		2014.12.01, 2014.12.02, 2014.12.03, 2014.12.04, 2014.12.05, 2015.01.01, 2015.01.02, 2015.01.03, 2015.01.04, 2015.01.05	ripe	rrc00, rrc01, rrc03, rrc04, rrc05, rrc06, rrc07, rrc10, rrc11, rrc12, rrc13, rrc14, rrc15
			routeviews	eqix, isc, jinx, kixp, linx, routeviews, routeviews2, routeviews3, saopaulo, sydney, telxatl, wide
		2015.02.01, 2015.02.02, 2015.02.03, 2015.02.04, 2015.02.05, 2015.07.01, 2015.07.02, 2015.07.03, 2015.07.04, 2015.07.05	ripe	rrc00, rrc01, rrc03, rrc04, rrc05, rrc06, rrc07, rrc10, rrc11, rrc12, rrc13, rrc14, rrc15
			routeviews	eqix, isc, jinx, kixp, linx, routeviews2, routeviews3, saopaulo, sydney, telxatl, wide
		2016.04.01, 2016.04.02, 2016.04.03, 2016.04.04, 2016.04.05, 2016.06.01, 2016.06.02, 2016.06.03, 2016.06.04, 2016.06.05	ripe	rrc00, rrc01, rrc03, rrc04, rrc05, rrc06, rrc07, rrc10, rrc11, rrc12, rrc13, rrc14, rrc15, rrc16
			routeviews	eqix, isc, jinx, kixp, linx, routeviews2, routeviews3, saopaulo, sydney, telxatl, wide
		2016.09.01, 2016.09.02, 2016.09.03, 2016.09.04, 2016.09.05	ripe	rrc00, rrc01, rrc03, rrc04, rrc05, rrc06, rrc07, rrc10, rrc11, rrc12, rrc13, rrc14, rrc15, rrc16
			routeviews	eqix, isc, kixp, linx, routeviews2, routeviews3, saopaulo, sydney, telxatl, wide
	traceroute	2015.07.01, 2015.07.02	ark	ams-nl, ams2-nl, ams5-nl, amw-us, anc-us, am-se, atl-us, avl-us, aza-us, bcn-es, bed3-us, bfi-us, bjc-us, bjl-gm, bma-se, bre-de, bre2-de, bre3-de, bud2-hu, bwi-us, cbg-uk,

cdg-fr, cgk-id, cij-kr, cmn-ma, cph-dk, dac-bd, dfw-us, dkr-sn, dub-ie, eug-us, fnl-us, gai-us, gig-br, gva-ch, hel-fi, hkg2-cn, hkg3-cn, hlz-nz, hnl-us, iad-us, igx-us, ith-us, jfk-us, kna-cl, lax-us, lej-de, lex-us, mel-au, mnl-ph, mry-us, msy-us, mty-mx, muc-de, nce2-fr, nic-cy, nrt-jp, oak-us, oak2-us, osl-no, osl2-no, pao-us, per-au, pna-es, pry-za, mo-us, san-us, san2-us, san3-us, sao-br, sao2-br, scl-cl, she-cn, sin-sg, sjc2-us, sju-pr, sof-bg, sql-us, syd-au, till-ee, tpe-tw, vie-at, wbu-us, wlg-nz, wvi-us, ylk-ca, yow-ca, yto-ca, yyz-ca, zrh-ch, zrh2-ch

2015.07.03 ark

ams-nl, ams2-nl, ams5-nl, amw-us, anc-us, am-se, atl-us, avl-us, aza-us, bcn-es, bed3-us, bfi-us, bjg-us, bjl-gm, bma-se, bre-de, bre2-de, bre3-de, bud2-hu, bwi-us, cbg-uk, cdg-fr, cgk-id, cij-kr, cmn-ma, cph-dk, dac-bd, dfw-us, dkr-sn, dub-ie, eug-us, fnl-us, gai-us, gig-br, gva-ch, hel-fi, hkg2-cn, hkg3-cn, hlz-nz, hnl-us, iad-us, igx-us, ith-us, jfk-us, kna-cl, lax-us, lej-de, lex-us, mel-au, mnl-ph, mry-us, msy-us, muc-de, nce2-fr, nic-cy, nrt-jp, oak-us, oak2-us, osl-no, osl2-no, pao-us, per-au, pna-es, pry-za, mo-us, san-us, san2-us, san3-us, sao-br, sao2-br, scl-cl, she-cn, sin-sg, sjc2-us, sju-pr, sof-bg, sql-us, syd-au, till-ee, tpe-tw, vie-at, wbu-us, wlg-nz, wvi-us, ylk-ca, yow-ca, yto-ca, yyz-ca, zrh2-ch

2015.07.04,  
2015.07.05 ark

ams-nl, ams2-nl, ams5-nl, amw-us, anc-us, am-se, atl-us, avl-us, aza-us, bcn-es, bed3-us, bjg-us, bjl-gm, bma-se, bre-de, bre2-de, bre3-de, bud2-hu, bwi-us, cbg-uk, cdg-fr, cgk-id, cij-kr, cmn-ma, cph-dk, dac-bd, dfw-us, dkr-sn, dub-ie, eug-us, fnl-us, gai-us, gig-br, gva-ch, hel-fi, hkg2-cn, hkg3-cn, hlz-nz, hnl-us, iad-us, igx-us, ith-us, jfk-us, kna-cl, lax-us, lej-de, lex-us, mel-au, mnl-ph, mry-us, msy-us, nce2-fr, nic-cy, nrt-jp, oak-us, osl-no, osl2-no, pao-us, per-au, pna-es, pry-za, mo-us, san-us, san2-us, san3-us, sao-br, sao2-br, scl-cl, she-cn, sin-sg, sjc2-us, sju-pr, sof-bg, sql-us, syd-au, till-ee, tpe-tw, vie-at, wbu-us, wlg-nz, wvi-us, ylk-ca, yow-ca, yto-ca, yyz-ca, zrh2-ch

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# AS Rank: AS Ranking

This page presents the BETA version of AS Rank, CAIDA's ranking of [Autonomous Systems \(AS\)](#) (which approximately map to Internet Service Providers) and organizations (Orgs) (which are a collection of one or more ASes). This ranking is derived from topological data collected by CAIDA's [Archipelago Measurement Infrastructure](#) and [Border Gateway Protocol \(BGP\)](#) routing data collected by the [Route Views Project](#) and [RIPE NCC](#).

ASes and Orgs are ranked by their [customer cone size](#), which is the number of their direct and indirect customers. Note: We do not have data to rank ASes (ISPs) by traffic, revenue, users, or any other non-topological metric.

Download Data: [AS Relationship Data](#) [AS Organization](#) [AS Classification](#)

Feedback: [asrank-feedback@caida.org](mailto:asrank-feedback@caida.org)

[AS Ranking](#) [Org Ranking](#) [Information for a single AS](#) [Information for a single Org](#) [Background](#) [Data Sources](#) [Help](#)

[AS Ranking Help](#)

The top ASes ranked by customer cone size are displayed below.

Dataset: 2016-06-01 IPv4

For information about a specific AS, enter its AS name, its AS number, or the name of the Org of which the AS is a member.

Look up an AS by number or name

Table shows 20 of 54772 ASes, sorted by number of ASes in customer cone update view

AS rank	AS number	AS name	Org name	AS Type(s)	customer cone						AS transit degree
					Number of			Percentages of all			
					ASes	IPv4 Prefixes	IPv4 Addresses	ASes	IPv4 Prefixes	IPv4 Addresses	
1	3356	LEVEL3	Level 3 Communications, Inc.	Tr/Ac	29,494	224,970	783,401,728	53%	34%	36%	4138
2	174	COGENT-174	Cogent Communications	Tr/Ac	23,299	172,963	616,423,936	42%	26%	28%	4567
3	1299	TELIANET	Telia Company AB	Tr/Ac	21,954	191,391	667,346,176	40%	29%	31%	1272
4	2914	NTT-COMMUN...	NTT America, Inc.	Tr/Ac	18,991	174,304	642,432,768	34%	26%	29%	1352
5	3257	GTT-BACKBONE	Tinet Spa	Tr/Ac	18,140	161,377	565,089,024	33%	24%	26%	1282
6	6762	SEABONE-NET	TELECOM ITALIA SPARKLE S.p.A.	Tr/Ac	14,394	123,771	329,530,624	26%	18%	15%	534
7	6453	AS6453	TATA COMMUNICATIONS (AMERICA) INC	Tr/Ac	12,300	135,127	533,133,824	22%	20%	24%	685
8	6939	HURRICANE	Hurricane Electric, Inc.	Tr/Ac	8,088	79,800	278,942,720	14%	12%	12%	4809
9	2828	XO-AS15	XO Communications	Tr/Ac	6,251	60,271	250,568,448	11%	9.2%	11%	1089
10	1273	CW	Vodafone Group PLC	Tr/Ac	5,878	42,258	173,223,936	10%	6.4%	8.1%	296
11	3549	LVL-3549	Level 3 Communications, Inc.	Tr/Ac	4,735	38,675	99,505,920	8.6%	5.9%	4.6%	3409
12	701	UUNET	MCI Communications Services, Inc. d/b/a Verizon Business	Tr/Ac	4,527	50,007	414,235,392	8.3%	7.6%	19%	1301
13	6461	ZAYO-6461	Zayo Bandwidth Inc	Tr/Ac	4,479	31,915	120,272,640	8.2%	4.9%	5.6%	1488
14	4436	AS-GTT-4436	nLayer Communications, Inc.	Tr/Ac	4,145	34,659	135,533,568	7.6%	5.3%	6.3%	838
15	209	CENTURYLIN...	Qwest Communications Company, LLC	Tr/Ac	3,988	37,005	278,455,808	7.3%	5.6%	12%	1651
16	9002	RETN-AS	RETN Limited	Tr/Ac	3,820	16,677	23,978,496	7.0%	2.5%	1.1%	1161

17	3491	BTN-ASN	Beyond The Network America, Inc.	Tr/Ac	3,572	53,910	187,765,504	6.5%	8.2%	8.7%	547
18	20485	TRANSTELECOM	Closed Joint Stock Company TransTeleCom	Tr/Ac	3,447	16,612	25,126,400	6.3%	2.5%	1.2%	1883
19	1239	SPRINTLINK	Sprint	Tr/Ac	3,439	46,061	330,382,848	6.3%	7.0%	15%	582
20	3320	DTAG	Deutsche Telekom AG	Tr/Ac	3,378	21,350	203,363,072	6.2%	3.3%	9.5%	508

#### data sources

<b>geolocation</b>	BGP	2010.08.01, 2010.08.02, 2010.08.03, 2010.08.04, 2010.08.05	routeviews	eqix, isc, kixp, linx, routeviews2
	database	2010.08.30	netacuity	
<b>organization</b>	whois	0000.00.00, 2012.06.29, 2013.10.01, 2014.01.01	JPNIC, KRNIC, LACNIC	AFRINIC, APNIC, ARIN, LACNIC, RIPE
<b>topology</b>	BGP	2013.11.01, 2013.11.02, 2013.11.03, 2013.11.04, 2013.11.05	ripe	rrc00, rrc01, rrc03, rrc04, rrc05, rrc06, rrc07, rrc10, rrc11, rrc12, rrc13, rrc14, rrc15
		2014.03.01, 2014.03.02, 2014.03.03	routeviews	eqix, isc, jinx, kixp, linx, routeviews, routeviews2, saoppaulo, sydney, telxatl, wide
		2014.03.04, 2014.03.05	ripe	rrc00, rrc01, rrc03, rrc04, rrc05, rrc06, rrc07, rrc10, rrc11, rrc12, rrc13, rrc14, rrc15
		2014.03.01, 2014.03.02, 2014.03.03	routeviews	eqix, isc, jinx, linx, routeviews, routeviews2, routeviews3, saoppaulo, sydney, telxatl, wide
		2014.03.04, 2014.03.05	ripe	rrc00, rrc01, rrc03, rrc04, rrc05, rrc06, rrc07, rrc10, rrc11, rrc12, rrc13, rrc14, rrc15
		2014.03.01, 2014.03.02, 2014.03.03	routeviews	eqix, isc, jinx, kixp, linx, routeviews, routeviews2, routeviews3, saoppaulo, sydney, telxatl, wide
		2014.09.01, 2014.09.02, 2014.09.03, 2014.09.04, 2014.09.05	ripe	rrc00, rrc01, rrc03, rrc04, rrc05, rrc06, rrc07, rrc10, rrc11, rrc12, rrc13, rrc14, rrc15
		2014.09.01, 2014.09.02, 2014.09.03, 2014.09.04, 2014.09.05	routeviews	eqix, isc, jinx, kixp, linx, routeviews, routeviews2, routeviews3, routeviews6, saopaulo, sydney, telxatl, wide
		2014.12.01, 2014.12.02, 2014.12.03, 2014.12.04, 2014.12.05	ripe	rrc00, rrc01, rrc03, rrc04, rrc05, rrc06, rrc07, rrc10, rrc11, rrc12, rrc13, rrc14, rrc15
		2014.12.01, 2014.12.02, 2014.12.03, 2014.12.04, 2014.12.05	routeviews	eqix, isc, jinx, kixp, linx, routeviews, routeviews2, routeviews3, saopaulo, sydney, telxatl, wide
		2015.01.01, 2015.01.02, 2015.01.03, 2015.01.04, 2015.01.05	ripe	rrc00, rrc01, rrc03, rrc04, rrc05, rrc06, rrc07, rrc10, rrc11, rrc12, rrc13, rrc14, rrc15
		2015.02.01, 2015.02.02, 2015.02.03, 2015.02.04, 2015.02.05	ripe	rrc00, rrc01, rrc03, rrc04, rrc05, rrc06, rrc07, rrc10, rrc11, rrc12, rrc13, rrc14, rrc15
		2015.07.01, 2015.07.02, 2015.07.03, 2015.07.04, 2015.07.05	routeviews	eqix, isc, jinx, kixp, linx, routeviews2, routeviews3, saopaulo, sydney, telxatl, wide
		2016.04.01, 2016.04.02, 2016.04.03, 2016.04.04, 2016.04.05	ripe	rrc00, rrc01, rrc03, rrc04, rrc05, rrc06, rrc07, rrc10, rrc11, rrc12, rrc13, rrc14, rrc15, rrc16
		2016.06.01, 2016.06.02, 2016.06.03, 2016.06.04, 2016.06.05	routeviews	eqix, isc, jinx, kixp, linx, routeviews2, routeviews3, saopaulo, sydney, telxatl, wide
		2016.09.01, 2016.09.02, 2016.09.03, 2016.09.04, 2016.09.05	ripe	rrc00, rrc01, rrc03, rrc04, rrc05, rrc06, rrc07, rrc10, rrc11, rrc12, rrc13, rrc14, rrc15, rrc16
		2016.09.01, 2016.09.02, 2016.09.03, 2016.09.04, 2016.09.05	routeviews	eqix, isc, kixp, linx, routeviews2, routeviews3, saopaulo, sydney, telxatl, wide
	traceroute	2015.07.01,	ark	ams-nl, ams2-nl, ams5-nl, amw-us, anc-us, am-se, atl-us, avl-us, aza-us, bcn-es, bed3-

2015.07.02		us, bfi-us, bjc-us, bjl-gm, bma-se, bre-de, bre2-de, bre3-de, bud2-hu, bwi-us, cbg-uk, cdg-fr, cgk-id, cjj-kr, cmn-ma, cph-dk, dac-bd, dfw-us, dkr-sn, dub-ie, eug-us, fnl-us, gai-us, gig-br, gva-ch, hel-fi, hkg2-cn, hkg3-cn, hlz-nz, hnl-us, iad-us, igx-us, ith-us, jfk-us, kna-cl, lax-us, lej-de, lex-us, mel-au, mnl-ph, mry-us, msy-us, mty-mx, muc-de, nce2-fr, nic-cy, nrt-jp, oak-us, oak2-us, osl-no, osl2-no, pao-us, per-au, pna-es, pry-za, mo-us, san-us, san2-us, san3-us, sao-br, sao2-br, scl-cl, she-cn, sin-sg, sjc2-us, sju-pr, sof-bg, sql-us, syd-au, til-ee, tpe-tw, vie-at, wbu-us, wlg-nz, wvi-us, ylk-ca, yow-ca, yto-ca, yyz-ca, zrh-ch, zrh2-ch
2015.07.03	ark	ams-nl, ams2-nl, ams5-nl, amw-us, anc-us, am-se, atl-us, avl-us, aza-us, bcn-es, bed3-us, bfi-us, bjc-us, bjl-gm, bma-se, bre-de, bre2-de, bre3-de, bud2-hu, bwi-us, cbg-uk, cdg-fr, cgk-id, cjj-kr, cmn-ma, cph-dk, dac-bd, dfw-us, dkr-sn, dub-ie, eug-us, fnl-us, gai-us, gig-br, gva-ch, hel-fi, hkg2-cn, hkg3-cn, hlz-nz, hnl-us, iad-us, igx-us, ith-us, jfk-us, kna-cl, lax-us, lej-de, lex-us, mel-au, mnl-ph, mry-us, msy-us, muc-de, nce2-fr, nic-cy, nrt-jp, oak-us, oak2-us, osl-no, osl2-no, pao-us, per-au, pna-es, pry-za, mo-us, san-us, san2-us, san3-us, sao-br, sao2-br, scl-cl, she-cn, sin-sg, sjc2-us, sju-pr, sof-bg, sql-us, syd-au, til-ee, tpe-tw, vie-at, wbu-us, wlg-nz, wvi-us, ylk-ca, yow-ca, yto-ca, yyz-ca, zrh2-ch
2015.07.04, 2015.07.05	ark	ams-nl, ams2-nl, ams5-nl, amw-us, anc-us, am-se, atl-us, avl-us, aza-us, bcn-es, bed3-us, bjc-us, bjl-gm, bma-se, bre-de, bre2-de, bre3-de, bud2-hu, bwi-us, cbg-uk, cdg-fr, cgk-id, cjj-kr, cmn-ma, cph-dk, dac-bd, dfw-us, dkr-sn, dub-ie, eug-us, fnl-us, gai-us, gig-br, gva-ch, hel-fi, hkg2-cn, hkg3-cn, hlz-nz, hnl-us, iad-us, igx-us, ith-us, jfk-us, kna-cl, lax-us, lej-de, lex-us, mel-au, mnl-ph, mry-us, msy-us, nce2-fr, nic-cy, nrt-jp, oak-us, osl-no, osl2-no, pao-us, per-au, pna-es, pry-za, mo-us, san-us, san2-us, san3-us, sao-br, sao2-br, scl-cl, she-cn, sin-sg, sjc2-us, sju-pr, sof-bg, sql-us, syd-au, til-ee, tpe-tw, vie-at, wbu-us, wlg-nz, wvi-us, ylk-ca, yow-ca, yto-ca, yyz-ca, zrh2-ch

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# A Baker's Dozen, 2015 Edition

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 [dyn.com /blog/a-bakers-dozen-2015-edition/](http://dyn.com/blog/a-bakers-dozen-2015-edition/)

**Whois:** Earl Zmijewski Earl leads a peerless team of data scientists who are committed to analyzing Dyn's vast Internet Performance data resources and applying their expertise to continually improve upon Dyn's products and services.

As is our annual tradition, this blog provides a year-end review of how the Internet providers at the top of our [Internet Intelligence – Transit](#) global rankings fared over the previous year. The structure and performance of the Internet remains a huge blind spot for most enterprises, even those critically dependent on it for business operations. Whether it's the [next 3 billion people coming online](#), [poor performance due to suboptimal routing](#), impaired connectivity due to [natural disasters or sabotage](#), [slow DNS performance](#), [routing leaks](#), or [security breaches](#) of a trust-based Internet infrastructure, Dyn provides critical insight into the structure and performance of the Internet, both real-time and historical, via its [Internet Intelligence](#) product suite. More importantly, our services help our customers make the changes necessary to [optimize Internet availability, reliability, and reach](#) in a very dynamic environment.

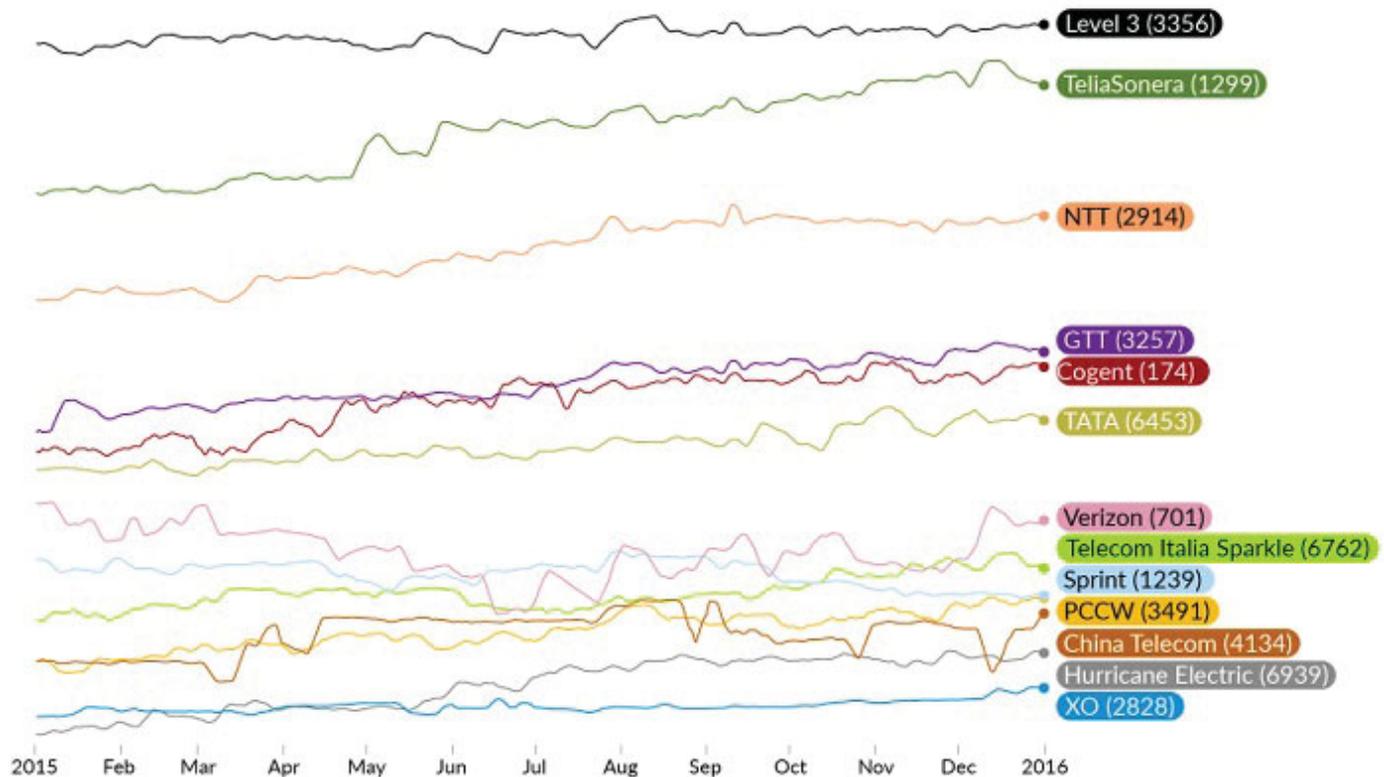
Back in [2008](#), we chose to look at the 13 providers that spent at least some time in the Top Ten that year, hence the name "[Baker's Dozen](#)". We repeated that exercise in [2009](#), [2010](#), [2011](#), [2012](#), [2013](#), and [2014](#). During the past 8 years, I've written each of these blogs and fully expected to have written my last entry on this topic, largely because these rankings cover such a very small slice of our data and we have many more interesting things to talk about relative to both Internet performance and security. So I thought I'd let this topic quietly fade away, but the requests for a 2015 edition have become too voluminous to ignore, although I make no promises about 2016! As in the past, I'll focus on *global IPv4 rankings*, given the lack of IPv6 adoption at the Internet's edge, where most IP space is allocated. Anyone wishing to explore our IPv6 rankings or further investigate our IPv4 rankings should subscribe to our [Internet Intelligence – Transit](#) product. This application provides full details of every AS on the global Internet, overall and by market, along with news events of interest concerning changes in transit and customer wins and losses.

Without further ado, then, let's highlight a few of the trends and changes we observed in 2015 relative to the top global Internet providers.

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**And the Winners are ...**

# Baker's Dozen for 2015



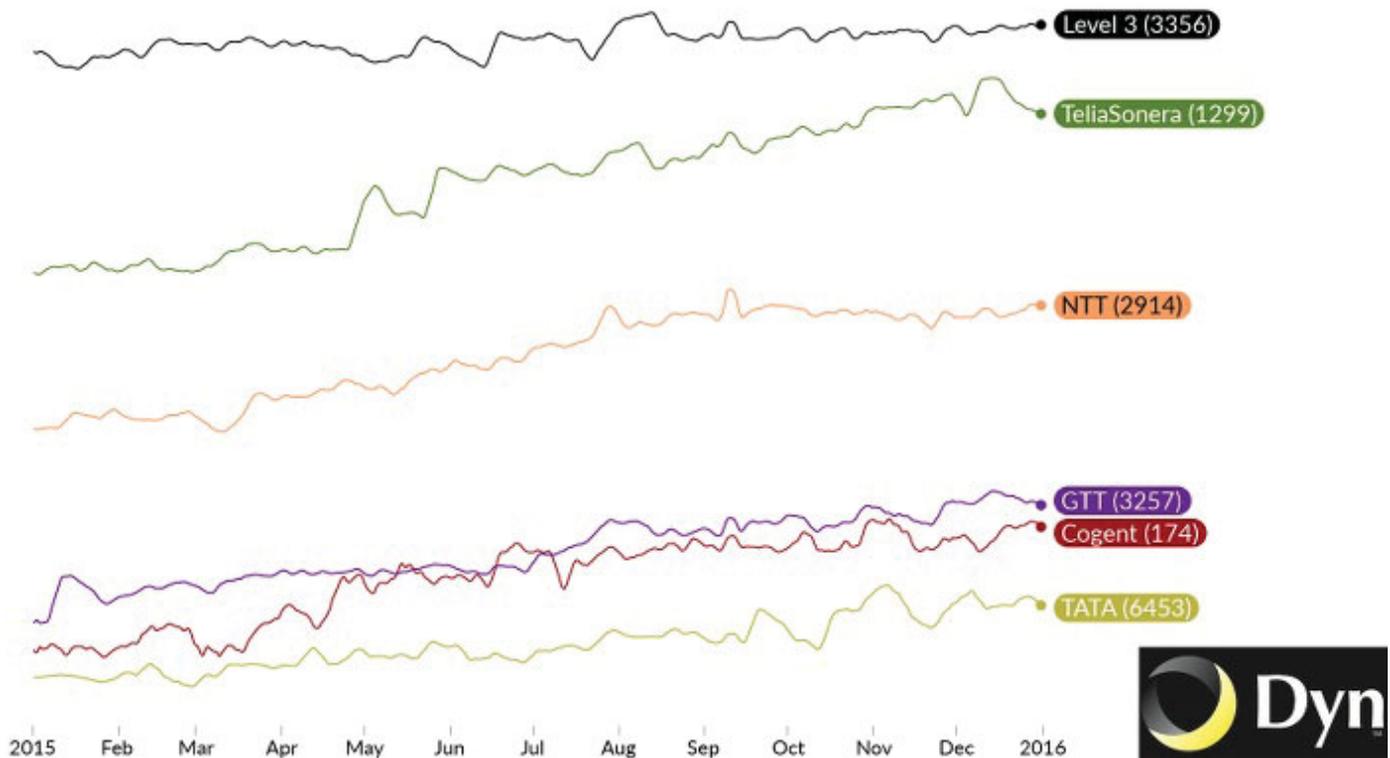
The above graph shows our global scores for the Baker's Dozen over the past year. As always, the absolute scores (computed from the [quantity of transited IP space](#)) are not meaningful in this context, so we omit the scale. At this high level, we see more or less steady growth for all of the players and some seemingly minor jockeying for position throughout 2015. However, our final annual rankings are anything but predictable, as 2015 saw some significant changes.

The biggest story of 2015 was the meteoric ascent of TeliaSonera (#2) as it challenged Level 3 for the #1 global ranking, a position Level 3 has held without interruption since the end of 2008. TeliaSonera actually surpassed Level 3 briefly in 2016 and is a fraction of a percent below them as of this writing, an achievement we never could have imagined. 2015 also saw very solid gains from NTT (#3), PCCW (#10) and Hurricane Electric (#12), while Verizon (#7) and Sprint (#9) continued their multi-year decline. As we'll see below, in just 8 years, 5 of the original 13 Baker's Dozen have either ceased to exist as independent entities or have lost enough market share to eliminate them from this list of top-tier players.

To make more sense of the tangled graphic above and this year's changes, we'll divide up the players into three tiers and zoom in on each in turn.

## The Top of the Heap

# Baker's Dozen for 2015: Providers 1-6



Level 3 (AS3356) completed their [acquisition of Global Crossing](#) (AS3549) back in October of 2011. Over the intervening years, we continued to show them as separate entities, since their networks had not yet been fully merged. As Level 3 has integrated Global Crossing's old network into AS3356, Level 3's score by this AS-oriented metric has risen, as if it were acquiring new customers. If Global Crossing had remained an independent entity, it would have been #12 in 2014. At the time of this writing, it has fallen to #15 and, as predicted last year, has now disappeared entirely from our Baker's Dozen report. Despite the relatively flat appearance of its score during 2015, Level 3's growth did increase by almost 10% relative to our metric, with big gains in transited prefixes from PCCW (AS3491) and its wide range of customers including China Mobile, Vietnam's Viettel, and Orange Egypt (Mobinil), formerly LINKdotNET. Level 3's score was hurt by the loss of customers such as Global Cloud Xchange (AS15412), a subsidiary of Reliance Communications, Taiwan's Digital United (AS4780), Turk Telekom (AS9121), and others. Turk Telekom moved away from Level 3 to NTT.

When we first wrote about the Level 3 merger with Global Crossing in early 2011, we called the new entity a "[global colossus](#)" and, as recently as last year, we said that "[Level 3 probably has the #1 spot locked up for some time](#)". But after a two-year tear by TeliaSonera (AS1299), the rising company closed out 2015 within striking range of the top spot. In fact, in early 2016, Level 3 and TeliaSonera have traded the #1 spot several times, with TeliaSonera just a fraction of a percent below Level 3 as of this writing. At this rate, TeliaSonera could easily exit the year as the undisputed #1 global Internet transit provider, a turn of events that seemed almost unimaginable back in 2011 when we stated that "[the next five global providers would have to merge to rival the new Level 3's score!](#)" TeliaSonera's gains were impressive and wide ranging with increases in transited prefixes from China Mobile (AS58453), South Korea's SK Broadband (AS9318, formerly Hanaro), Bell Canada (AS577) and Brazil's Oi (AS7738, formerly Telemar) to name just a few.

While early 2014 saw TeliaSonera and NTT (AS2914) battling it out for the #2 spot, NTT's growth, while very impressive, failed to keep up with TeliaSonera, leaving NTT the undisputed #3 by a wide margin from both those above and below it in the rankings. At the end of 2014, the providers in the next 3 spots after NTT were virtually indistinguishable, but 2015 saw this group begin to separate a bit. After steady gains all year, GTT and Cogent ended the year at #4 and #5 (respectively), but Cogent moved into the #4 position with a comfortable lead over GTT in early 2016. Tata (AS6543) experienced steady growth throughout the year, including a big win in transited prefixes from Canada's Telus (AS852), and ended the year ranked #6 globally.

## A Muddled Middle

### Baker's Dozen for 2015: Providers 7-9



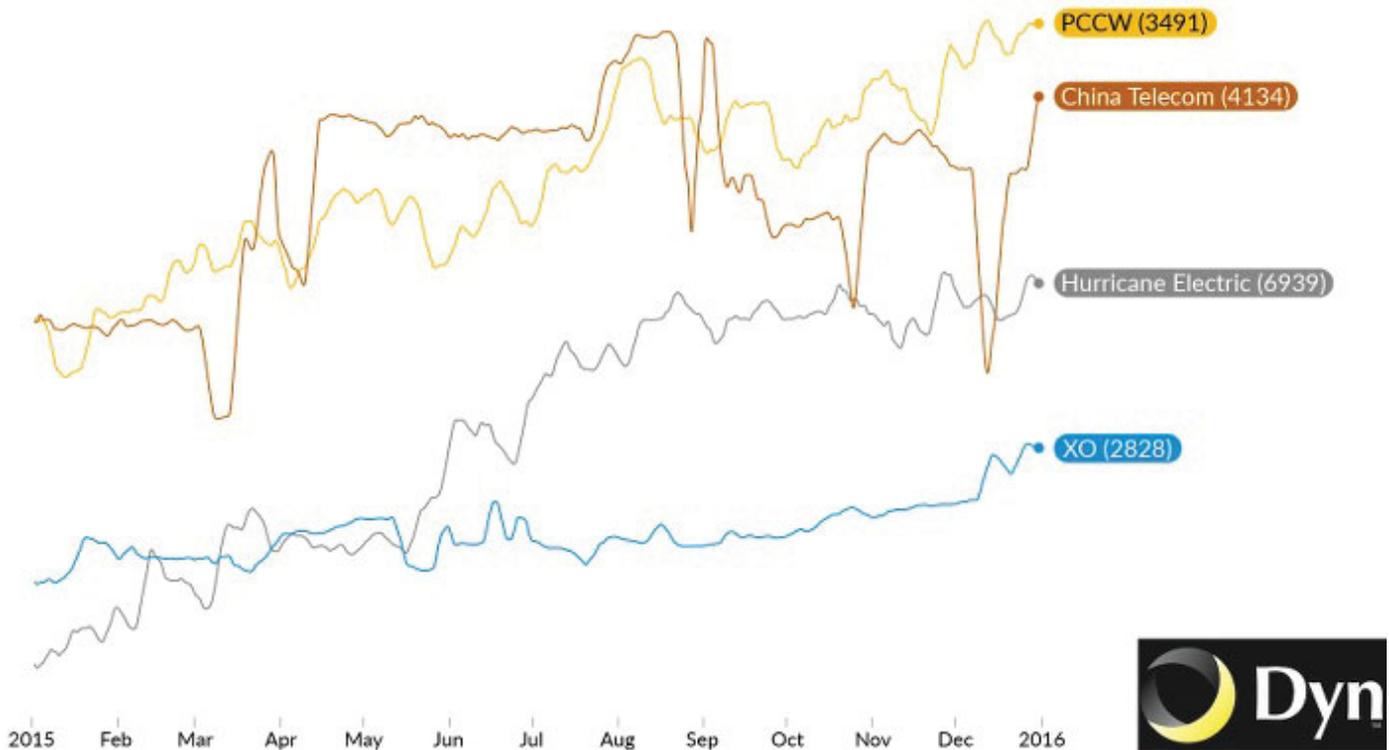
Verizon (AS701) started 2015 ranked #7 globally, only to dive bomb to #9 by mid-year and then climb back to #7 as 2015 came to a close. Some big customer losses included Time Warner (AS4323), which moved exclusively to Level 3, Korea Telecom (AS4766), China Mobile (AS58453) and Russia's Vimpelcom (AS3216). These losses were partially offset by increases in transit prefixes from SK Broadband, Road Runner (AS7843), Brazil's Embratel (AS4230), and China Unicom (AS4837).

Sprint started the year ranked #8, only to fall to #9 by year end. Throughout the year, it saw major reductions in transit prefixes from Taiwan's Chunghwa Telecom (AS9680) and Telstra Global (AS4637) to name a few. The losses for Sprint only continued into 2016, as their ranking now stands at #10. Telecom Italia Sparkle (AS6762) was the one relatively consistent performer in this group, moving up one spot during the year to #8. Major gains in transited prefixes came from Bharti Airtel (AS9498), Brazil's Tim Celular S.A. (AS26615), Hibernia (AS5580) and Pacnet

(AS10026), while significant transit losses came from the CAT Telecom (AS4651, formerly Communications Authority of Thailand) and India's BSNL (AS9829).

## Third Fiddle

# Baker's Dozen for 2015: Providers 10-13



The two consistent performers in this group were PCCW Global (AS3491) and Hurricane Electric (AS6939), exhibiting consistent and steady growth throughout 2015. PCCW, ending the year at #10, saw gains in transited prefixes from South Korea's Enterprise Networks (AS9848), South America's Uninet (AS28513), China Mobile (AS58453) and many others. Hurricane Electric (AS6939), moving up one spot to #12, saw gains in transit from Japan's Softbank (AS17676), Cox Communications (AS22773), Charter Communications (AS20115), Venezuela's GlobeNet (AS52320) and a wide range of other customers.

As we noted [last year](#), China Telecom's erratic rankings are due to the sometimes odd, incestuous routing it maintains with local competitors. In 2015, many of the huge swings in China Telecom's score were due to substantial changes in transited prefixes from competitor China Unicom. An increase in transited prefixes from China Educational and Research Network (AS4538) accounted for much of China Telecom's end-of-year surge. China Telecom is also looking abroad and [targeting](#) the [Brazilian](#) and [South African](#) markets. The laggard in our third tier was XO, losing one spot to finish the year at #13. XO saw modest increases in transited prefixes from both Columbus Networks USA (AS23520) and ITC Deltacom (AS6983). XO's extensive footprint in the highly developed US market might account for its slower growth relative to its rivals. In early 2016, [Verizon announced it was buying XO's fiber network](#).

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## Conclusions

A lot has changed in the Internet transit market over the last eight years. Back in 2008, our rankings were dominated by traditional US carriers, many of which have exited the Baker's Dozen entirely or dropped significantly in their global rankings. In the early years of this blog, we talked about AT&T (AS7018), now ranked #21, Qwest (AS209), now CenturyLink and ranked #14, and Savvis (AS3561), [owned by CenturyLink since 2011](#), but with an AS that is still ranked #34. Also during this time, Sprint fell from #1 to #10 and Verizon has tumbled from #3 to #7. Two bright spots for US carriers have been the rise of Cogent from the bottom of the Baker's Dozen to the #4 spot today and the dominance of Level 3, ranked #1 for years but now seriously threatened by TeliaSonera.

Other notable changes over this time period include the [acquisition of Global Crossing by Level 3](#), as mentioned earlier. And we saw Tiscali's global network, #10 back in 2008, [end up in the hands of GTT](#), vaulting GTT into our Baker's Dozen. Whew! That's an amazing amount of change in a short period of time in the upper rungs of a mature industry. But it is no longer the Western world, where the Internet is a ubiquitous commodity, that's driving the Internet's growth. Rather the battle for global Internet dominance will continue to play out in the underserved markets, such as [Asia](#), [South America](#) and now [Africa](#).

While providers like to advertise their annual Dyn ranking, these metrics are of little value if your ISP delivers poor performance to your target market. Tools like Dyn's [Internet Intelligence – Transit](#) show you who the players are in any given market, while Dyn's [Internet Intelligence](#) and [Internet Intelligence – Network](#) keep an eye on their performance (and those of cloud and CDN providers) and the [security of your own Internet assets](#). Because at the end of the day, reaching your customers effectively on the Internet is all about [performance](#).

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# A Baker's Dozen, 2016 Edition

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 [dyn.com /blog/a-bakers-dozen-2016-edition/](http://dyn.com/blog/a-bakers-dozen-2016-edition/)

Whois: Earl Zmijewski Earl leads a peerless team of data scientists who are committed to analyzing Dyn's vast Internet Performance data resources and applying their expertise to continually improve upon Dyn's products and services.

As is our annual tradition, this blog provides a year-end review of how the Internet providers at the top of our [Internet Intelligence – Transit](#) global rankings fared over the previous year. The [structure](#), [performance](#) and [security](#) of the Internet remains a huge blind spot for most enterprises, even those critically dependent on it for business operations. These are familiar topics that we've covered over the years in this blog and our [Twitter feed](#), and 2016 was no different. We saw bogus routing and subsequent grossly misdirected traffic from [Ukraine](#) and [Iran](#), for just two examples. We saw [cable breaks](#), [new cable activations](#), [censorship](#) and [crippling attacks](#). And much, much more. Dyn provides such critical insight into the structure and performance of the Internet, both real-time and historical, and uses this data set to make 40 billion traffic steering decisions daily for customers.

Back in [2008](#), we chose to look at the 13 providers that spent at least some time in the Top Ten that year, hence the name "Baker's Dozen". We repeated that exercise in [2009](#), [2010](#), [2011](#), [2012](#), [2013](#), [2014](#), and [2015](#). And for the first time in 2015, we even provided a [regional Baker's Dozen blog](#), illustrating how substantially the provider rankings vary by continent. During these past 9 years, I've really wanted to retire this story line, since these rankings cover such a very small slice of our data and we have many more interesting things to talk about. But each year this time, the clamor starts to grow from our dedicated fan base, and I dust off this data set yet again. As in the past, I'll focus on *global IPv4 rankings*, given the lack of IPv6 adoption at the Internet's edge, where most IP space is allocated. Anyone wishing to explore our IPv6 rankings or further investigate our IPv4 rankings should subscribe to our [Internet Intelligence – Transit](#) product. This application provides full details of every AS on the global Internet, overall and by market, along with news events of interest concerning changes in transit and customer wins and losses.

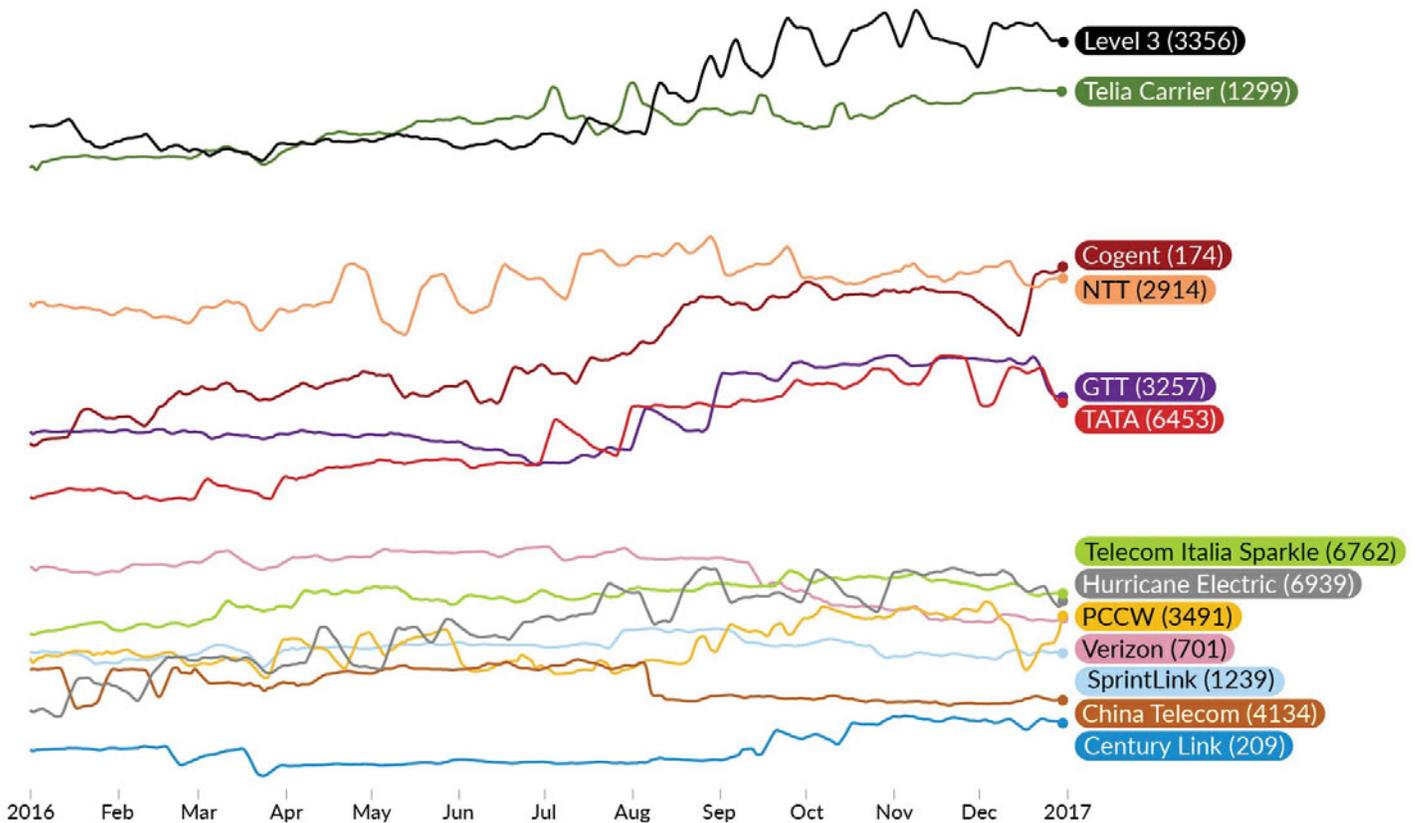
While the specific details of ranking changes differ from year to year, my overall story line is often the same, namely, traditional US carriers continue to fade from view, while providers more focused on emerging markets continue to climb in our rankings. In fact, last year, I wrote: "Back in 2008, our rankings were dominated by traditional US carriers, many of which have exited the Baker's Dozen entirely or dropped significantly in their global rankings." But businesses can grow either organically or by acquisition, and several US firms have announced buyouts that should shake up the rankings once completed. In fact, US carriers now take 3 of the top 5 spots in our global rankings with Level 3 once again in a seemingly unassailable position.

In what follows, we'll briefly review some of the trends and changes we observed in 2016 relative to the top global Internet providers, and then we'll dive into what a post-acquisition world might look like over the next couple of years.

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**Drum roll please ...**

# Baker's Dozen for 2016



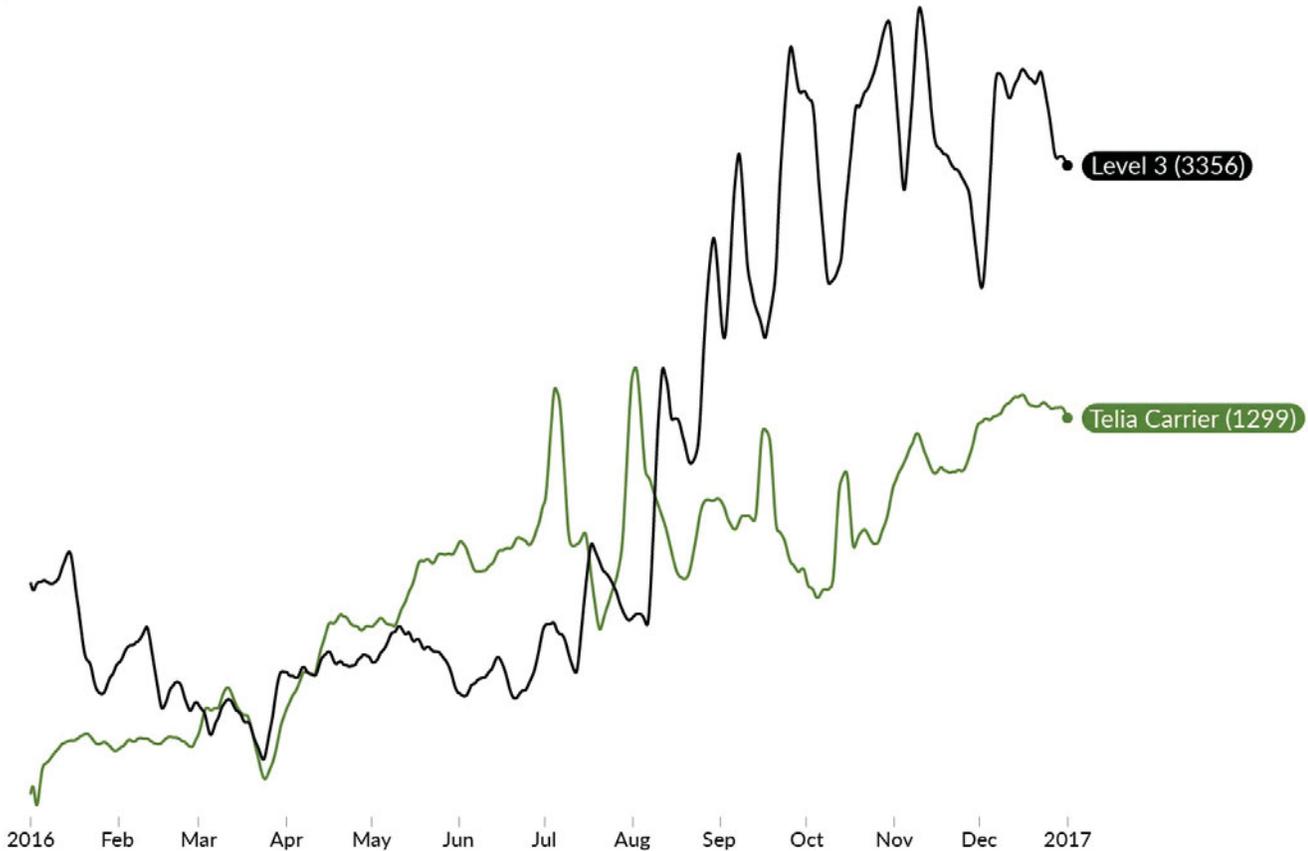
The above graph shows our global scores for the Baker's Dozen over the past year. As always, the absolute scores (computed from the [quantity of transited IP space](#)) are not meaningful in this context, so we omit the scale. At this high level, we see more or less steady growth for all of the players and some seemingly minor jockeying for position throughout 2016. However, our final annual rankings are anything but predictable, as 2016 saw some significant changes.

Last year, we saw Level 3 (#1) dramatically pull away from Telia Carrier (#2), after Level 3 had briefly given up its roughly eight year run at the top of the heap. And as we will see below, this margin is only likely to increase in the coming years. Cogent represents another big win for US carriers, surging from #5 to #3 (by a hair) in a single year's time. Last year saw NTT drop from its long held #3 position to #4, while Tata made steady gains and fought GTT for the #5 spot, before (barely) ending the year at #6, the same spot as last year. Another US carrier, Hurricane Electric, also saw impressive gains, moving all the way from #12 to #8. The more traditional US carriers, namely, Verizon, Sprint and Century Link, languished near the bottom of our rankings. However, as we will see, merger activity stands to improve the lot of at least two of these entities. In short, US carriers are beginning to reassert themselves on the global stage after a long period of stagnation or decline.

To make more sense of the tangled graphic above and this year's changes, we'll divide up the players into three tiers and zoom in on each in turn. Then we'll discuss the proposed mergers and how they might shake up our rankings.

And then there were two

## Baker's Dozen for 2016: Providers 1-2



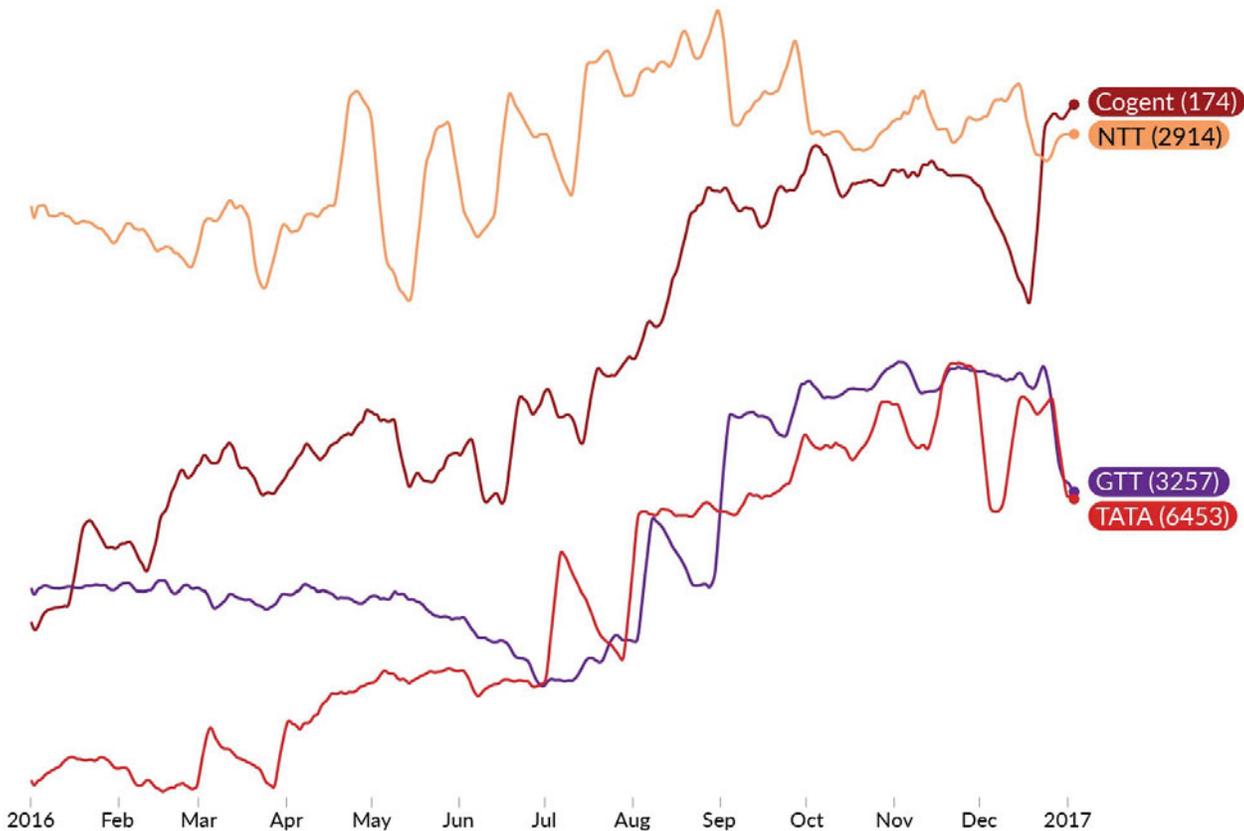
The beginning of last year saw Telia Carrier and Level 3 in a close fight for #1, with Telia opening up a sizable lead by mid-year. Although Level 3 (AS3356) completed their [acquisition of Global Crossing](#) (AS3549) back in October of 2011, over the intervening years, Level 3 continued to treat Global Crossing more like a peer (with respect to routing), since their networks had not yet been fully merged. And we continued to show them as separate entities. That changed in mid-2016 and Level 3 picked up credit for all of Global Crossing's downstream customers, accounting for Level 3's surge back to #1 in August.

When we first wrote about the Level 3 merger with Global Crossing in early 2011, we called the new entity a “[global colossus](#)” and stated that “[the next five global providers would have to merge to rival the new Level 3's score!](#)” Telia Carrier's steady growth since then has given Level 3 a serious challenger and 2016 ended with Telia's score just 5% below that of Level 3's, despite Level 3 finally getting full credit for Global Crossing by our scoring algorithm. However, [CenturyLink's proposal to buy Level 3](#) (expected to close in late 2017) should ultimately give the combined new entity another huge boost in our global rankings, perhaps allowing it to remain at the top of the leader board for many more years.

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**A surging middle**

# Baker's Dozen for 2016: Providers 3-6

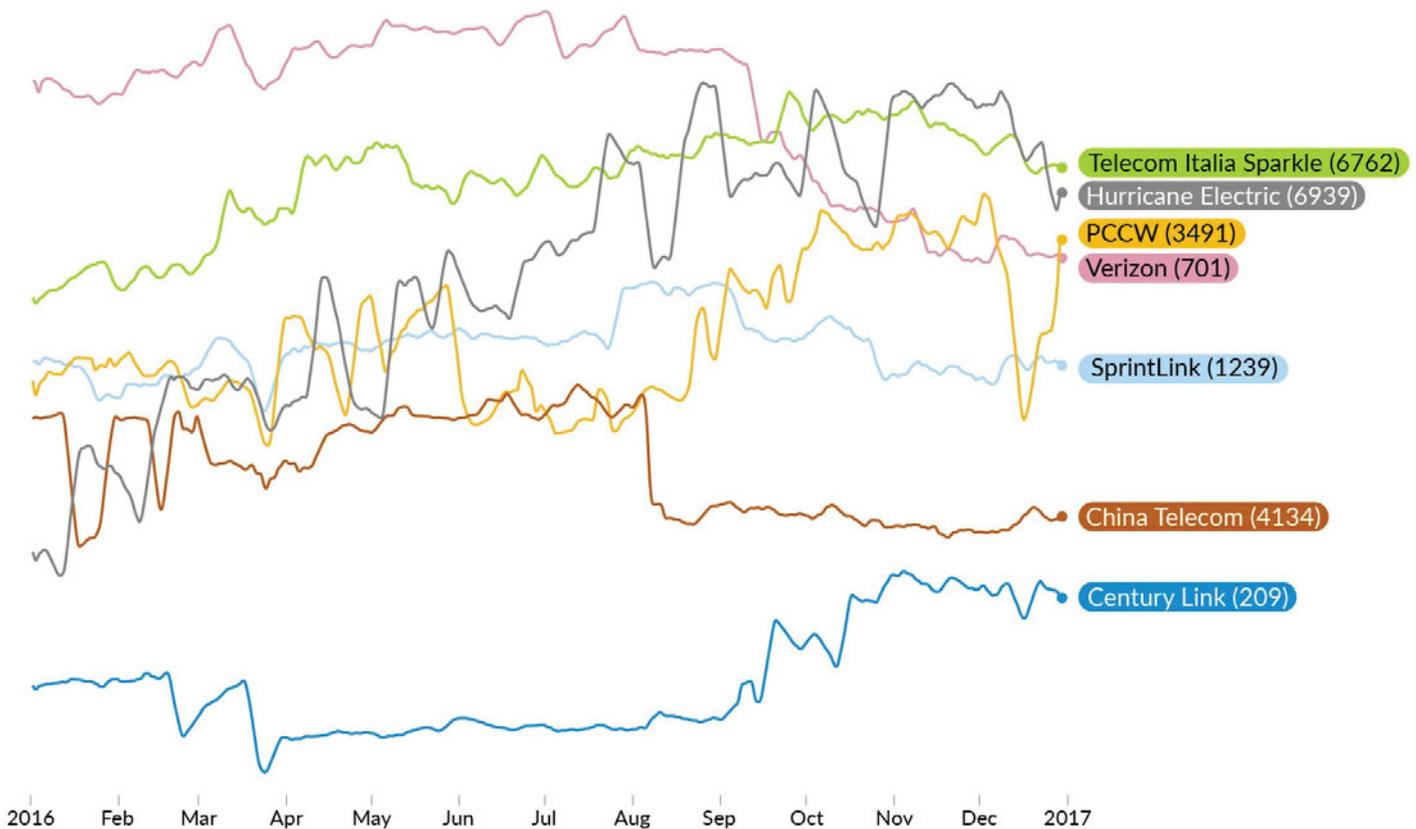


Last year saw consistent and solid gains for all the carriers in this group. But the true star of the show was Cogent, surging all the way from #5 to #3 in twelve short months. Cogent's rise was in no small part due to broad-based gains from Asian carriers. Cogent's substantial end-of-year drop was the result of losing Apple (AS714) as a customer. But they quickly began to recover with more gains in Asia, such as increased transit from PT Telekomunikasi Indonesia (AS7713), Rostelecom (AS12389) and Pacnet (AS10026) to name a few, ending the year just ahead of NTT. NTT's growth was a bit more erratic, but still about 4% over where they started the year and just a hair below Cogent at year end.

The other US carrier in this group is GTT. While 2016 saw GTT drop from #4 to #5 in our global rankings, due to Cogent's rise, they still saw some impressive gains in the second half of the year after lackluster first half. GTT's gains were due in part to increased transit in Asia, such as increases from strong regional players like Korea Telecom (AS4766) and Japan's KDDI (AS2516). Tata was a much more consistent performer throughout the year with solid transit gains in Asia from the likes of SingTel (AS7473), SK Broadband (Hanaro) (AS9318), LG Uplus (LG DACOM) (AS3786), and Vietnam Posts and Telecommunications (AS45899). Only year-end declines by both GTT and Tata kept GTT ahead of Tata by the narrowest of margins. Tata lost some transit from Vietnam's Viettel (AS7552) and Singtel, while GTT gave up some of its earlier gains from KDDI.

## The best of the rest

# Baker's Dozen for 2016: Providers 7-13



The biggest stories in our final tier again belong to American carriers with Hurricane Electric surging all the way from #12 to #8, while Verizon fell precipitously from #7 to #10. Hurricane Electric saw transit gains from Telstra Global (AS4637), Mexico's Uninet (AS8151) and China Railway (AS9394), among others. Verizon's second half of the year plunge was due in part to losing large customers such as LG Uplus, Bharti Airtel Ltd. (AS9498) and C&W Networks (AS23520). To round out the American carriers listed here, Sprint spend much of the year treading water, while Century Link's late year surge was due in part to a considerable increase in transit from Telstra Global .

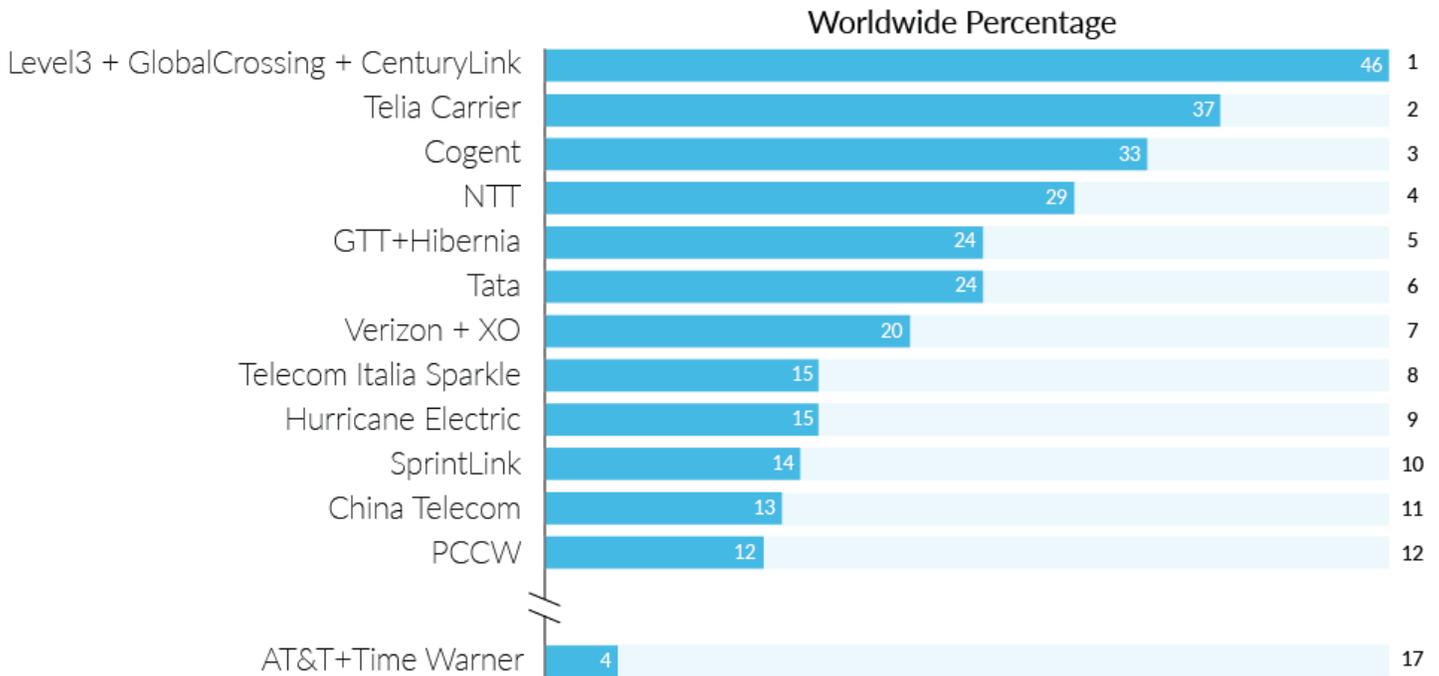
## Conclusions and a look to the future

Traditionally, in this section, I talk about the decline of US carriers and the rise of those focused on the emerging world where there is still considerable growth in connecting up [the rest of humanity](#). But something profound changed in 2016. For the first time since [2011](#), two American carriers were among the top three in our global rankings. And as we illustrated above, American carriers are making big gains in the emerging world, where Internet connectivity can still be considered a novelty.

Plus 2016 saw a wave of M&A announcements. CenturyLink, [owners of Qwest and Savvis](#), [announced plans to purchase Level 3](#), [owners of Global Crossing](#). [GTT said they'd acquire Hibernia](#), a deal that [closed at start of 2017](#). [Verizon laid claim to XO](#) and even AT&T, which left our Baker's Dozen entirely in [2013](#), got into the act by

[announcing plans to acquire Time Warner](#). But our rankings are not based on acquisition announcements or even actual ownership. They are based on objective routing data, which definitively shows how networks are interconnected and from which you can infer real world dependencies. In other words, until two entities are routed as if they were a single business, we treat them separately.

But let's assume for a moment that all of these proposed acquisitions complete *and* all of the relevant networks are immediately merged. What would our global rankings look like then? Using their current customers, we performed our scoring calculations on all of the purposed mergers, resulting the following breakdown by global market share. The percentages add up to more than 100%, since any organization serious about its Internet presence is multi-homed, i.e., has more than one service provider for redundancy.



Here we see Level 3, CenturyLink, et al. with 46% of the global market share, which is considerably less than the 55% a [merged Level 3 and Global Crossing](#) would have had back in 2011. The main effect of the current proposed merger is to extend Level 3's lead over Telia. A merged GTT and Hibernia keeps GTT at #5, but a merged Verizon and XO propels Verizon from #10 to #7. And a combined AT&T and Time Warner lifts AT&T from #25 all the way to #17, but still along way from regaining a place in our Baker's Dozen.

In conclusion, while our global rankings are more diversified then they were a decade ago, American carriers with a renewed focus on emerging markets and strategic acquisitions have definitively shown that they are [not dead yet](#). It will be interesting to see if they can maintain this momentum. Stay tuned.

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