DE-CIX

Annual Report 2015

Where networks meet

Content

Harald A. Summa
CEO DE-CIX Management GmbH &
DE-CIX International AG

Message from the CEO

Back in 1995, we couldn't even envisage the dimensions the Internet and the market associated with it would take on. It took us fifteen years to reach the peak of one Terabit per second of data throughput. In 2015, we achieved this increase in data throughput in just a single year.

There's no denying that the world we live in today is vastly different from the one in which DE-CIX took its first small interconnection steps. We've come a long way – as a society, as an industry, as a company – and the rate of innovation is, if anything, picking up speed.

So there's no time to sit back and enjoy the fruits of our past success. Infrastructure is always a long-term investment. We need to be looking around the next few corners and anticipating what the world will look like when the infrastructure we are now planning and building starts to reach its capacity. The digital revolution is upon us, and it will require creative and sometimes disruptive approaches to support companies and society through the process of transformation ahead of them.

It's hard for us to imagine now what the world will look like 20 years from now. Even five years from now. To stay relevant in an increasingly dynamic world market, we need to be flexible, adapt to the changing landscape and demands, predict future trends, and lead and drive the developments.

At DE-CIX, we are forging the interconnection fabric of the future. And this fabric of interwoven networks is only possible through the trust our many customers and partners have placed in us. We wish to continue to repay this trust into the future with the highest quality infrastructure and services.

Let's see where the future takes us!

Harald A. Summa
CEO
DE-CIX Management GmbH & DE-CIX International AG

Executive Summary

The Internet industry continues to grow at rates well above that of other industry sectors, something which is reflected in the activity at the DE-CIX Internet exchanges. 2015 was another highly successful year for DE-CIX Management GmbH, with high growth in customer numbers, reseller partners, and traffic. In particular, a spectacular increase in traffic over the Frankfurt exchange (43 percent up on 2014 figures) and in connected capacity (up 44 percent) show a direct correlation with the popularity of 100GE ports (sales having more than doubled in 2015).

Strategically, DE-CIX took steps both at home in Germany and abroad to ensure the continued relevance of their interconnection services, both at the regional and at the international level. Our teams were busy throughout 2015 with the establishment of new Internet Exchange Points and the expansion of the infrastructure and customer services.

Highlights of the year 2015 included the record traffic peak of 5.1 Tbps in December, the Capacity Award for Best Internet Exchange in November, and the establishment and commissioning of three international exchanges – in Marseille (France), Palermo (Italy), and Istanbul (Turkey). More information about our international activities can be read about in the separate chapter on DE-CIX International AG.

In late 2015, the decision was taken to undergo a process of corporate re-structuring for DE-CIX GmbH in 2016. For this, plans were made to divide the departmental responsibilities and create two new divisions, Interconnection Peering Solutions, and Innovation & Information Services, as well as to make changes to the leadership of the company. This saw the promotion of Daniel Melzer, Head of the Engineering Team, and Dr. Thomas King, Head of the R&D Department, to the positions of CTO and CIO respectively. In addition, two new leadership appointments were made in the international branches during 2015, with Ed d'Agostino becoming Vice President of DE-CIX North America Inc., and Bülent Sen being chosen as Regional Director of Turkey.

In contrast to the growth in traffic and sales, DE-CIX Management GmbH experienced an anticipated reduced growth rate (7%) in revenues in 2015. This was a direct result of the generous price reduction offered in 2015. The solid foundation of customers and an excellent reputation for service quality and availability enabled DE-CIX to weather the impact of such a substantial price reduction.

The milestones of 2015, our 20th anniversary year, stand us in good stead for further innovations in the coming years. DE-CIX will continue to evolve with the markets and will provide our customers with interconnection services adapted to fulfill their rapidly changing needs.

Harald A. Summa
CEO
DE-CIX Management GmbH &
DE-CIX International AG

Ivo Ivanov
Corporate Counsel
DE-CIX Management GmbH

Klaus Landefeld
Board Member
eco – Association of the
Internet Industry e. V.

Zaid Ali Khan
Senior Director Global
Infrastructure Architecture
and Strategy; LinkedIn

Bernhard Krönung
Managing Director and Founder
regio [.NET]

Organization and Corporate Governance

Company Structure

DE-CIX, the German Commercial Internet Exchange, is owned by eco e. V., the Association of the Internet Industry, Europe's largest Internet industry association, and operated by DE-CIX Management GmbH, a wholly owned subsidiary of eco. eco is a nonprofit organization that promotes the development of the Internet and provides advice and support to companies that do business with or on the Internet. DE-CIX Management GmbH is strictly carrier and data center-neutral, and it also operates the regional Internet exchanges DE-CIX Hamburg, and opened DE-CIX Dusseldorf in 2016.

DE-CIX GmbH is led by CEO Harald A. Summa, founding member of eco e. V., and is guided in its decision-making by the Customer Advisory Board. The Board is elected by DE-CIX GmbH customers, and meets twice a year to oversee management, develop strategy and ensure the secure and stable growth of the company.

The Customer Advisory Board

The Customer Advisory Board reflects the customer base, as its members can be seen as representatives of the variety of networks connected to DE-CIX: national and international, small and large ISPs as well as global content providers. The current DE-CIX Advisory Board was elected in 2014, with the following members:

- ■ **Klaus Landefeld**
  Board Member, eco – Association of the Internet Industry e. V.

- ■ **Zaid Ali Kahn**
  Senior Director Global Infrastructure Architecture and Strategy, LinkedIn

- ■ **Bernhard Krönung**
  Managing Director and Founder, regio[.NET]

- ■ **Joshua Sahala**
  Interconnection Strategist, Microsoft

- ■ **Falk von Bornstaedt**
  Head of Group Peering and IP-Trading, Deutsche Telekom AG

THE CUSTOMER ADVISORY BOARD

MANAGEMENT

Joshua Sahala
Interconnection Strategist
Microsoft

Falk von Bornstaedt
Head of Group Peering and
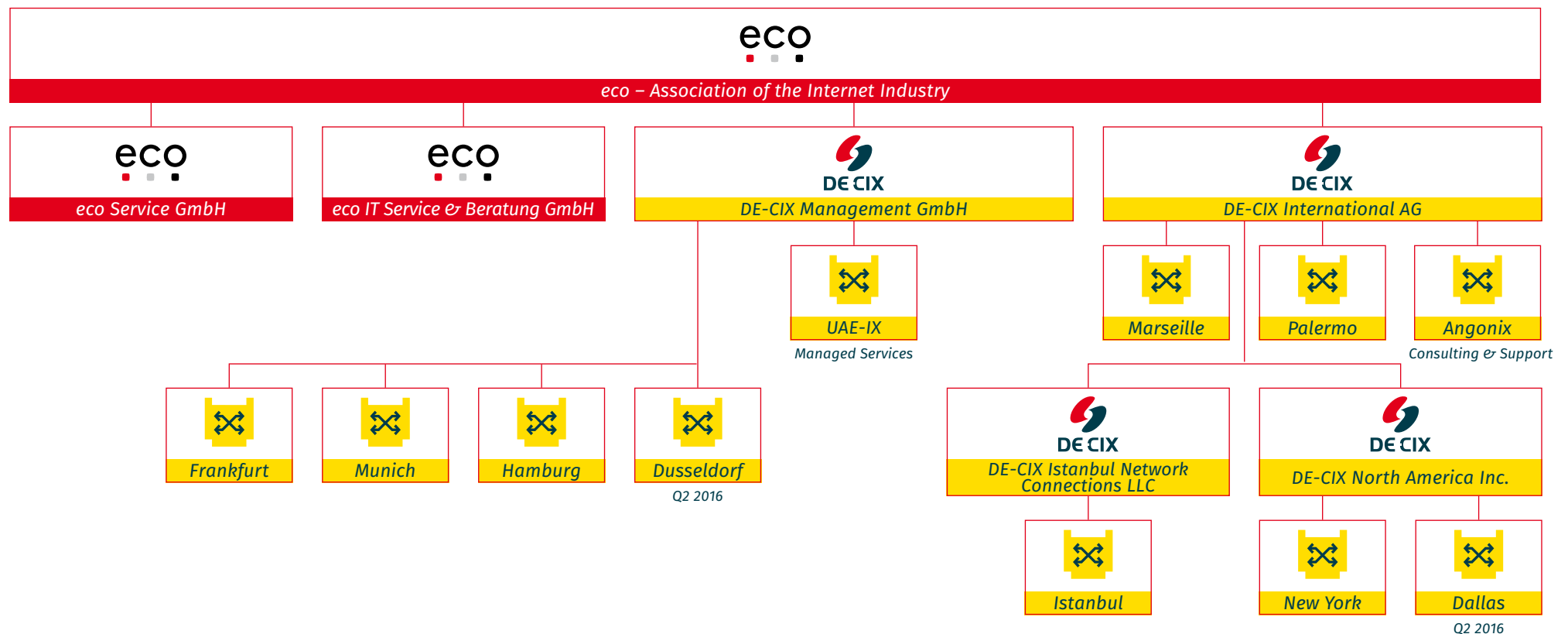IP-Trading
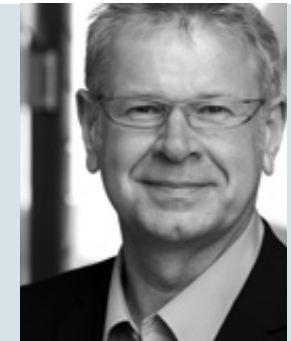Deutsche Telekom AG

Daniel Melzer,
CTO
DE-CIX Management GmbH

Thomas King
CIO
DE-CIX Management GmbH

Andreas Sturm
Head of Business
Development
DE-CIX Management GmbH

eco – Association of the Internet Industry

- eco Service GmbH
- eco IT Service & Beratung GmbH
- DE-CIX Management GmbH
  - UAE-IX
    Managed Services
    - Frankfurt
    - Munich
    - Hamburg
    - Dusseldorf
      Q2 2016
- DE-CIX International AG
  - Marseille
  - Palermo
  - Angonix
    Consulting & Support
  - DE-CIX Istanbul Network Connections LLC
    - Istanbul
  - DE-CIX North America Inc.
    - New York
    - Dallas
      Q2 2016

Arnold Nipper
CTO/COO

Capacity Award 2015 for Best Internet Exchange

DE-CIX was announced in November as the winner of the Capacity Award 2015 for Best Internet Exchange. This accolade is another confirmation of DE-CIX's outstanding expertise in operating Internet exchanges all over the world.

Award for Lifetime Achievement

At the Datacloud Europe Congress in Monaco, eco CEO Harald A. Summa was presented with the "Award for Lifetime Achievement". The jury honored his engagement as the founder and CEO of eco and DE-CIX.

Despite, or perhaps because of his many years of experience, Harald A. Summa has maintained his own perspective and often functions as a critical voice in processes of political or social opinion-shaping. He offers both the insight of an industry representative, as well as the critical perspective of an Internet pioneer. He has worked to bring networks, companies, and specialists together to form a stronger, more resilient, safer, and open Internet, a landscape which is innovation-friendly and supports Internet-related business activities.

Human Resources

As in all other areas of DE-CIX, 2015 saw continued growth in staff numbers. Starting the year with a team of 59, DE-CIX was further strengthened by the addition of 10 additional members of staff during the year. Around half of the new appointments were international, supporting the increasing internationalization of DE-CIX. Of the existing team, four former student assistants were also given full-time contracts – bringing a new generation of technical specialists into the company.

The growing workforce in Frankfurt resulted in the need to expand the office space, a task which was undertaken early in 2015.

In terms of management and leadership, several changes were made in 2015, and the roadmap for future changes was established.

In December 2015, Ed d'Agostino, Business Development for DE-CIX North America, was appointed Vice President of DE-CIX North America Inc. Also late in the year, Bülent Sen was chosen as Regional Director of Turkey, and he took up his appointment on 1 January 2016.

In addition, the decision was taken at the end of 2015 to undertake a full process of change management in the DE-CIX company structure, in order for the company to be able to concentrate more fully on the needs of our customers and on the demands in the marketplace. This change process included a re-design of the technical departments, creating two new divisions: "Interconnection & Peering Solutions" and "Innovation & Information Services".

This structural re-organization also entailed a change in leadership, with Arnold Nipper's stepping down to make way for a younger generation of leaders. Arnold Nipper will take on a new role as Chief Technology Evangelist for DE-CIX. In his place, Daniel Melzer, Head of the Engineering Team, and Dr. Thomas King, Head of the R&D Department, will lead DE-CIX into the future, taking on the roles of CTO and CIO respectively, and leading the two newly-formed divisions.

The change process will ideally future-proof DE-CIX and make the company ready for the further internationalization of our services.

Human Resources at DE-CIX endeavors to provide a motivating and engaging atmosphere for DE-CIX's high-quality staff. This includes offering weekly English lessons, German lessons for the international colleagues, and a growing range of professional development opportunities. Added to this, DE-CIX offers their staff an increasingly varied Health Care program, and a generous range of extra benefits. A relaxed and collegial atmosphere is encouraged.

As well as building an internationally diverse team, the HR department is also intent on developing more of a gender balance, and is actively seeking female specialists to join the team.

Further growth is anticipated in 2016, most especially in the technical and customer-related areas.
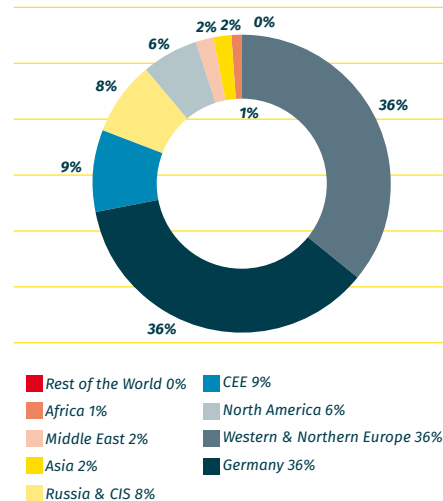
Customers

Customer Growth

Almost 20 percent growth in customer numbers at the Frankfurt exchange heralded an extremely successful year for DE-CIX Management GmbH in 2015. The changing dynamics of customer growth at DE-CIX Frankfurt partly reflects the international expansion of the DE-CIX brand, as well as the importance of the valued partners in the DE-CIX Partner Program.

Geographical Profile

In 2015, over 70 percent of DE-CIX customers were located in Germany and Western and Northern Europe, with Europe breaking even with Germany for the first time. Growth tripled in Germany, Western & Northern Europe, and North America in comparison to 2014.

Figure 1
Total Customers Per Region

- ■ Rest of the World 0%
- ■ Africa 1%
- ■ Middle East 2%
- ■ Asia 2%
- ■ Russia & CIS 8%
- ■ CEE 9%
- ■ North America 6%
- ■ Western & Northern Europe 36%
- ■ Germany 36%

New Customers

By far the largest proportion of new customers (46 percent) that connected to DE-CIX in 2015 were from Western and Northern Europe, displaying a clear preference for DE-CIX Frankfurt as the hub of choice for connectivity. In terms of new customers, Western and Northern Europe overtook Germany in 2015, demonstrating enormous growth potential in the region. North America showed continued steady growth, while Russia & CIS and CEE remained relatively constant.
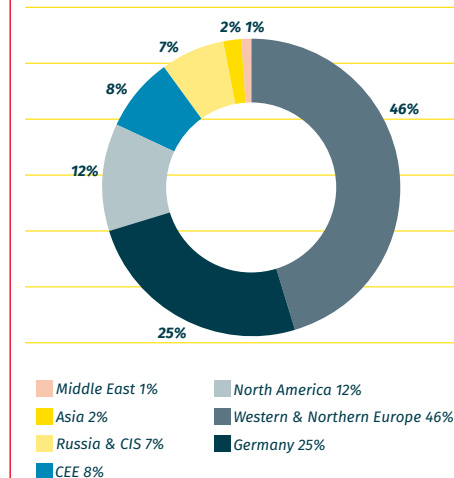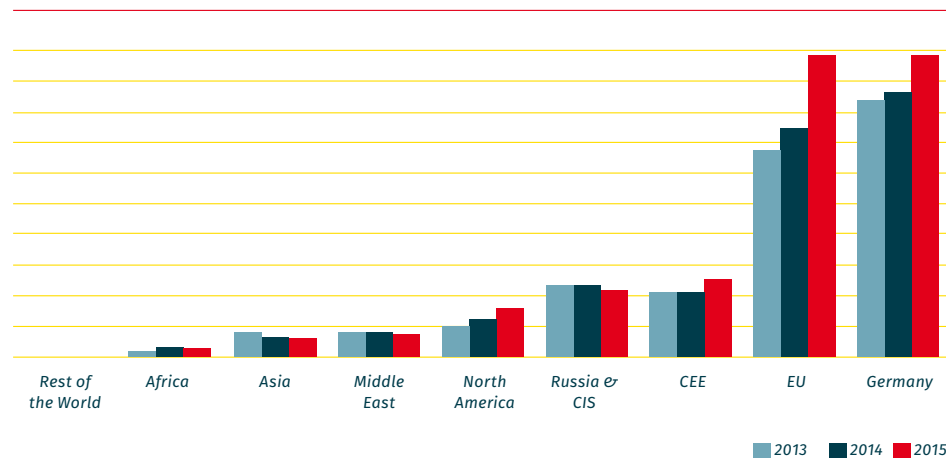
Figure 2
Total New Customers 2015

- ■ Middle East 1%
- ■ Asia 2%
- ■ Russia & CIS 7%
- ■ CEE 8%
- ■ North America 12%
- ■ Western & Northern Europe 46%
- ■ Germany 25%

Figure 3
Customer Growth Rates 2013-2015

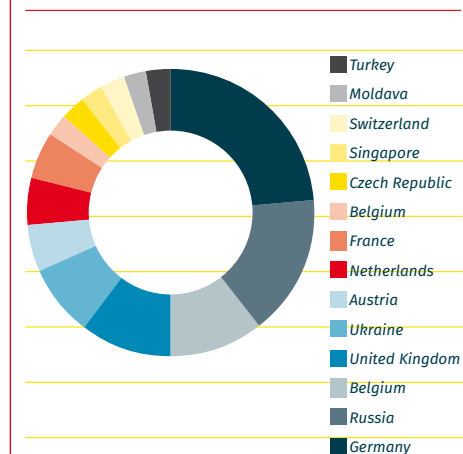| | | | | | | | | |
|Rest of the World|Africa|Asia|Middle East|North America|Russia & CIS|CEE|EU|Germany|

■ 2013 ■ 2014 ■ 2015

Reseller Program

The DE-CIX Reseller Program continued its positive development in 2015. Thirteen new reseller partners joined DE-CIX during the year, resulting in a total of 38 partners. The new partners were: DARZ, eunetworks, GlobalNet, Hofmeir IT, IP-Max, ITENOS, M247 Ltd., NetUSE, Oja.at, Rockenstein, SDT, Starnet, and Turk Telekom International.

In total, the two countries with the largest number of resellers are Germany and Russia, accounting for 40 percent of reseller partners. Of the remainder, the vast majority are from the European region.

Figure 4
Reseller Partners per Country 2015

- Turkey
- Moldava
- Switzerland
- Singapore
- Czech Republic
- Belgium
- France
- Netherlands
- Austria
- Ukraine
- United Kingdom
- Belgium
- Russia
- Germany

Together, these resellers connected 78 new customers to the Frankfurt exchange. By the end of 2015, 162 reseller end-customers were peering via DE-CIX Frankfurt. In total, the Reseller Program accounted for over a quarter of connected customers in 2015.

Figure 5
Direct and Reseller Customers 2015

- Direct Customers 71%
- Reseller End-Customers 23%
- Reseller 6%
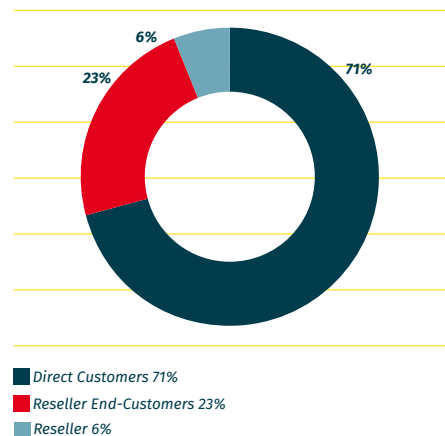
In 2015, DE-CIX optimized the ordering and provisioning of ports to increase efficiency, to ensure the maintenance of their high-quality service and reduce processing time.

The Reseller Program has also been active on an international level between the various DE-CIX managed exchanges. A lively interaction is developing between Frankfurt and DE-CIX New York (part of DE-CIX International AG), with five of the current reseller partners involved in bringing customers from one exchange to the other.

Upgrades & Port Growth

Along with new customers joining the network, many existing customers took the opportunity to upgrade to higher capacities, making use of the 100GE ports first offered in late 2013. A total of 204 upgrades were processed during 2014, of which 24 were 100GE ports. This had a strong impact on the connected capacity at DE-CIX Frankfurt, which exceeded 10 Terabits at the beginning of 2014, and rose to 13.4 Terabits during the year.

Figure 6
100GE Ports 2013-2015
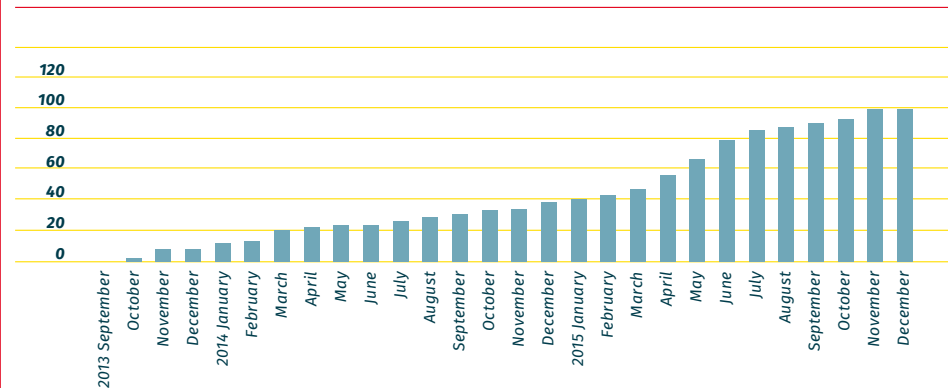
The number of 100 GE ports increased steadily throughout 2015. Although 10GE remained the clearly favored port-size for many customers, the ratio 10GE:100GE ports reduced consistently throughout the year, reaching 10:1 in October and continuing to shrink, in inverse proportion to the development in connected capacity.

Figure 7
10GE & 100GE Ports 2013-2015
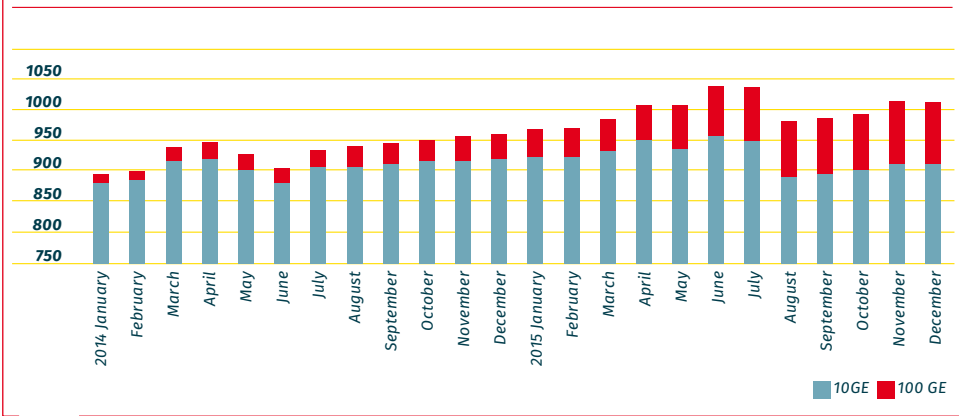
A range of customers took the opportunity which the 100GE ports offer to increase their bandwidth substantially. The largest single upgrade in 2015 was for 12 x 100GE ports, resulting in the largest connected capacity of a single customer at any Internet exchange world-wide.

Growth in 10 GE ports levelled out during the year and began to recede, as did 1GE ports. By the end of 2015, 100GE ports were responsible for more than half of the 18,967 Gigabits of connected capacity at DE-CIX Frankfurt. As a result of this trend, connected capacity at DE-CIX Frankfurt increased by an extraordinary 44 percent over the year.

1GE ports also saw a further slight reduction, continuing the trend of recent years away from the smallest port size.
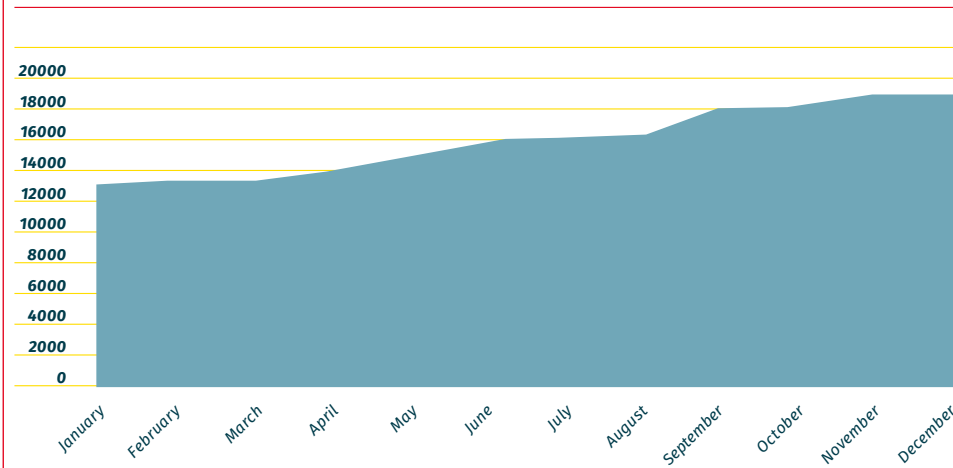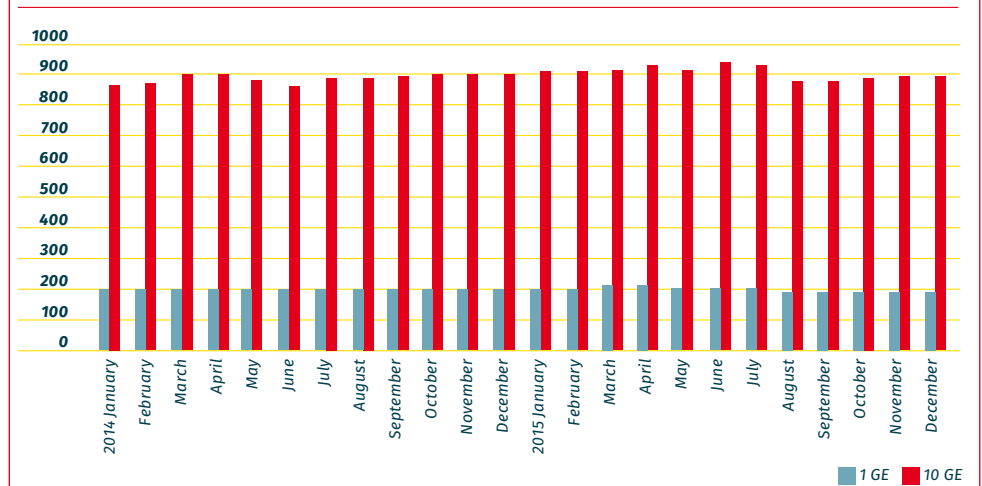
Figure 8
Connected Capacity (Gbits/s) 2015

20000	
18000	
16000	
14000	
12000	
10000	
8000	
6000	
4000	
2000	
0	

January · February · March · April · May · June · July · August · September · October · November · December

1 GE · 10 GE

Figure 9
1GE & 10GE Ports 2013-2015

1000	
900	
800	
700	
600	
500	
400	
300	
200	
100	
0	

2014 January · February · March · April · May · June · July · August · September · October · November · December · 2015 January · February · March · April · May · June · July · August · September · October · November · December

1 GE · 10 GE

Traffic

Peak and Average Traffic

Traffic growth over the DE-CIX platform continued its stratospheric growth in 2015. This meant that DE-CIX maintained its leading position as the public Internet Exchange Point with the highest data throughput worldwide.

The graph below shows growth in peak and average traffic through the DE-CIX Frankfurt exchange for the year 2015. Having finished 2014 with peak traffic of 3.59 Tbps, the growth rate in 2015 stood at 44 percent, resulting in the massive peak of 5.178 Tbps that can be seen in Fig. 10, in December 2015.


Figure 10
Average & Peak Traffic Frankfurt 2015
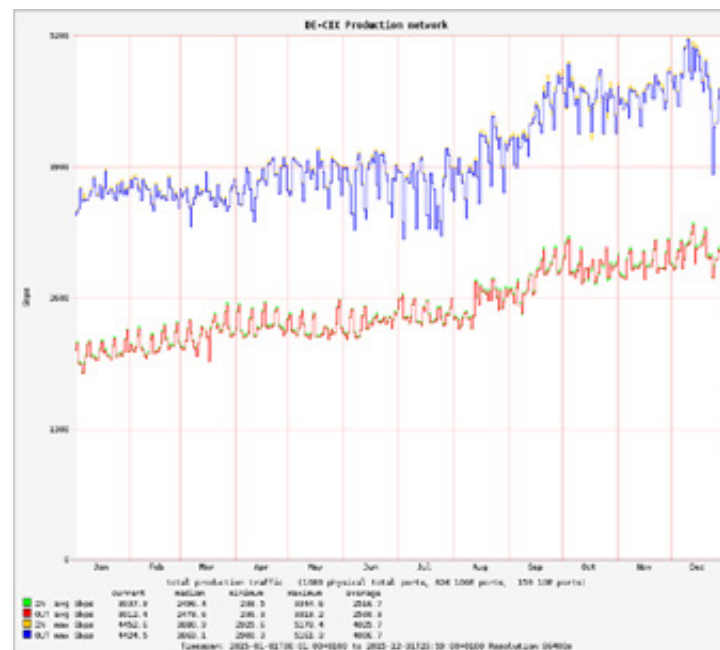
Average traffic over the DE-CIX Apollon platform in Frankfurt in 2015 rose from 1.757 Tbps to reach 2.517 Tbps by the end of the year, a rise of 43 percent. To illustrate the enormous rate of growth in traffic at DE-CIX Frankfurt, peak and average traffic for the years 2014 and 2015 can be seen in Fig. 11.

Figure 11
Average & Peak Traffic Frankfurt 2014-2015
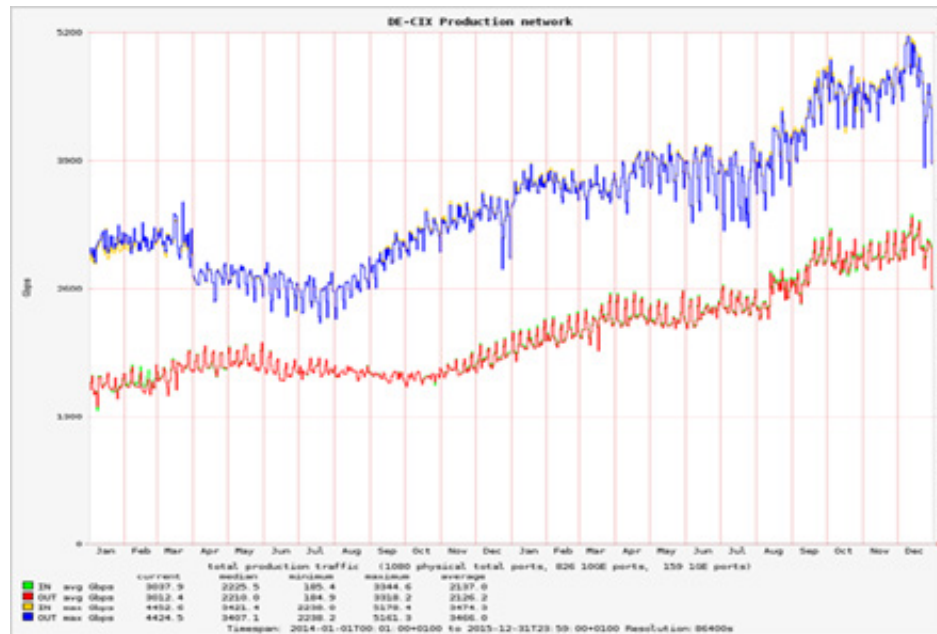
The representation shows the maximum input and output in yellow and blue, and the average for the time period in green and red. The average traffic is calculated based on five minute intervals, which are made up in turn of 60 second excerpts. The maximum data throughput is then the result of the maximum level attained in the 60 second excerpts. These excerpts are, however, not individually visible in the graph, leading to occasional apparent discrepancies between the two levels shown in the graph.

DE-CIX GmbH Regional Exchanges

Hamburg and Munich

The smaller regional Internet exchanges DE-CIX Munich and DE-CIX Hamburg are used mainly by customers from the respective region, engaging in local peering – part of DE-CIX's strategy of keeping local traffic local.

These Internet exchanges saw continued steady operation in 2015, with both locations showing a growth tendency despite strong seasonal fluctuations. While Munich achieved average and peak traffic of 9 Gbps and 40.6 Gbps respectively, Hamburg experienced average traffic of 22.5 Gbps and a new all-time peak traffic record of 55.2 Gbps.

During 2015, a total of 58 customers peered at the four sites – in Hamburg at n@twork and Global Connect, and in Munich at Equinix and SpaceNet.

Figure 12
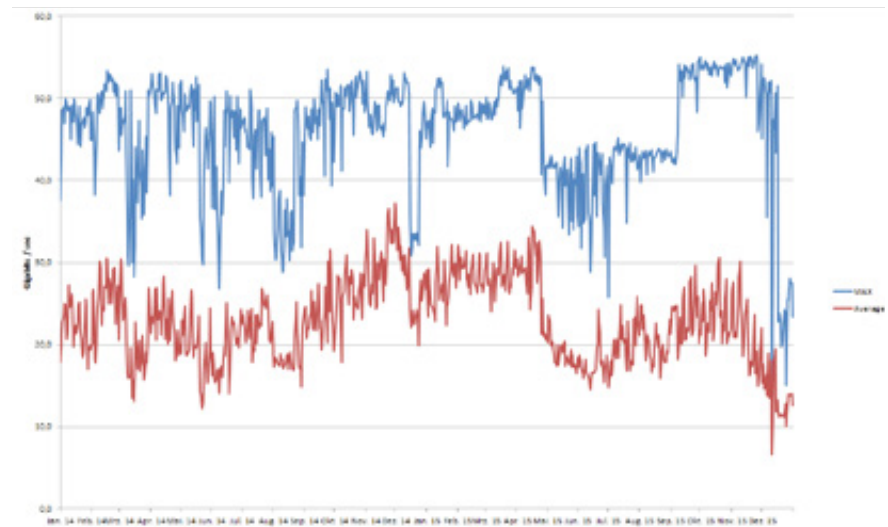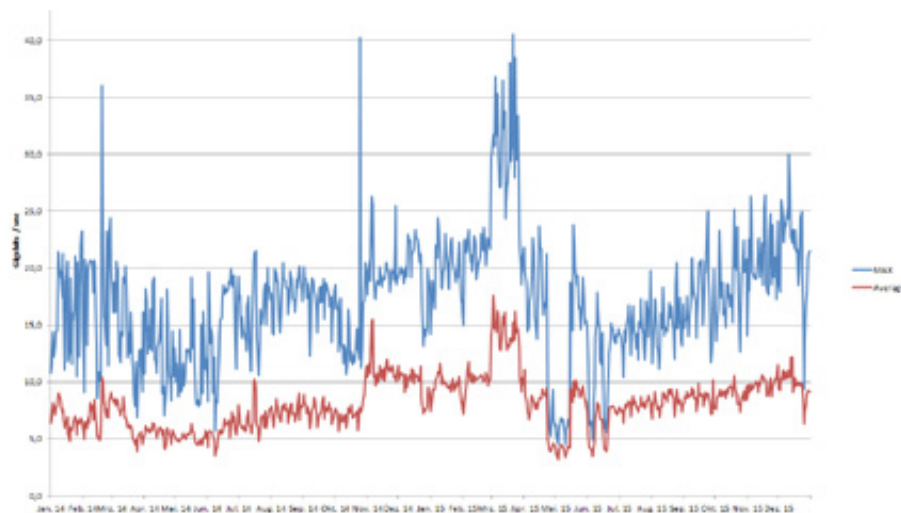*Average & Peak Traffic Hamburg 2015*

Figure 13
Average & Peak Traffic Munich 2015

DE-CIX Dusseldorf

In November 2015, DE-CIX announced the opening of the regional Internet Exchange DE-CIX Dusseldorf, which went operational in Q1 2016. DE-CIX Dusseldorf is located at the carrier-neutral Interxion data center, which gives access to more than 100 carriers and ISPs, content delivery networks and content providers.

Dusseldorf lies in the middle of the Rhine-Ruhr metropolitan region which has the third largest metropolitan area GDP in Europe (behind Paris and London) and more than 11 million inhabitants.

The Internet exchange is perfectly located between Frankfurt and Amsterdam and offers multiple benefits such as local and global redundancy, plus shorter routes into the region.

Technical Infrastructure

The cutting-edge platform DE-CIX Apollon provides world-class reliability and availability in a scalable design which can grow with the needs of DE-CIX's customers. Current plans see the core being scaled up to 30 Tbps in 2020.

The platform utilizes ADVA Optical Networking's FSP 3000 for the optical backbone, and Alcatel-Lucent's 7950 XRS. The optical backbone has a total capacity of 48 Tbps across a mesh-network topology and provides transport capacity of up to 8 Tbps per fiber. The Alcatel-Lucent Core Router 7950 XRS supports a world-leading port density of up to eighty 100 Gigabit Ethernet ports.

DE-CIX Apollon is built from four supernodes, each of them being a combination of an ADVA optical node, an Alcatel-Lucent edge switch and an Alcatel-Lucent core switch. DE-CIX Apollon delivers a very high level of redundancy: All four cores are in operation all the time. Should one fail, there is still sufficient capacity to switch all the traffic in every case. Only in the case of two simultaneous failures could a certain amount of congestion occur.

Departments

DE-CIX R&D & Security Department
ENDEAVOUR
The R&D Department successfully started working on the ENDEAVOUR project funded by the European Commission at the beginning of 2015. DE-CIX closely collaborates with five other partners to develop the next generation of IXPs based on the Software-Defined Networking paradigm. The research focuses on enabling novel and innovative features for IXP customers, by providing them more control and programmability for their interconnection with the IXP. The project is already in its second year and DE-CIX worked on defining those novel features before transforming them into real world demonstrators to show the potential of an SDN-enabled IXP.

BIG DATA SECURITY
Big Data Security is a project funded by the German Ministry of Education and Research. With the idea of processing and making use of large amounts of data to improve IT Security, it combines some of the hottest IT topics of our time. While the overall project's objective is to use today's big data technologies to progress in many areas of IT Security, DE-CIX will focus especially on the topic of denial of service attacks. The project started back in April 2015 and will run for 3 years. With this particular project, DE-CIX expects to develop various benefits for our customers to cope with DoS attacks.
Project Partners:

- University of Bonn
- Ruhr-University Bochum
- Fraunhofer AISEC
- SAP AG

IETF
The R&D Department is involved in a range of activities within the IETF community. The results from different research projects (e. g. ENDEAVOUR and Big Data Security) are submitted for standardization to the IETF. The main objective of these activities is to develop and drive novel ideas to ease the operation of IXP customers and IXP operators. DE-CIX authored or co-authored five Internet drafts, ranging from the introduction of a new well-known BGP community to signal a blackhole to improving EVPN for the IXP operator's use-case. The R&D Department will soon further improve those Internet drafts to be accepted by the IETF community as RFCs.

IT SECURITY ACT (IT-SICHERHEITSGESETZ) – INDUSTRY WORKING GROUP INTERNET INFRASTRUCTURE
In July 2015, the new IT Security Act came into force in Germany. The IT Security Act requires operators of Internet Infrastructure to implement specific levels of IT security. DE-CIX is a founding body of the Industry Working Group Internet Infrastructure. Dr. Thomas King is a deputy speaker of this working group. Within this group, different operators of Internet infrastructure (e.g., DENIC, Strato) gathered to work on a document that lays out standards for a minimum level of IT security as required by the IT Security Act. The interim results show that this document already includes the major IT security measures and recommendations for operators of Internet infrastructure. The document is expected to be finished in 2016.

Networks & Data Center Department
The year 2015 was marked on the one hand by the technical upgrade of the existing Internet exchanges in Frankfurt and New York, and on the other hand by the realization of new DE-CIX Internet exchanges. This was necessary in order to take account of the continuing strong growth in customers and the data throughput, and the internationalization of the DE-CIX brand.

The capacity of the connections to the core switches in Frankfurt was increased to 8 Terabits. In addition to this, the third Alcatel Lucent 7950 XRS-40 was taken into operation mid-year. This allows up to 1,600 10GE ports or 160 100GE ports to terminate at one switch.

Other activities for the NDC team included the establishment of three new international IXPs, in Palermo (Italy), Marseille (France), and Istanbul (Turkey). All three sites are based on the DE-CIX Apollon platform.

In New York, three additional sites were taken into operation and three sites were upgraded, as a result of the continuing growth in customer numbers. These sites were also equipped with Alcatel-Lucent hardware based on DE-CIX Apollon edge technology.

Systems Engineering Department
The Systems Engineering Team implemented a complete Desktop as a Service environment in 2015, in order to achieve independence from external service providers. For this, a complete groupware environment was created on the basis of Microsoft Exchange, along with a remote workplace environment on the basis of Citrix. These will be integrated with the Microsoft Dynamics CRM system, introduced in 2016. Through these changes and other measures, the Systems Engineering Team has developed into a highly professional internal IT service provider to support eco/DE-CIX's departments and increase their productivity.
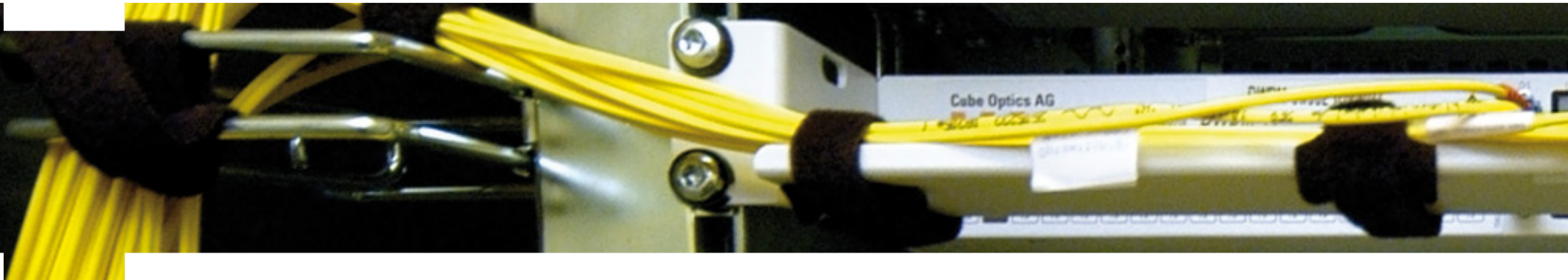
Services

Core components of the IT infrastructure were updated in 2015, including the firewall systems, the Internet connection, and the central storage system. In addition, the Internet hubs in Palermo, Istanbul, and Marseille were taken operational. A further highlight was implementing and taking Angonix into operation, in collaboration with Angola Cables.

Software Development Department
The Software Development Team was active for the majority of 2015 with the development of the new Service Insights System.

With this new system, customers that are logged into the customer portal are now able to check the overall utilization of their GlobePeer services and detailed peering traffic relationships.

The statistics about the overall utilization of a GlobePeer service also provide insights into how much IPv4 and IPv6 traffic is sent or received. The detailed traffic relationship statistics allow customers to check how much traffic is exchanged with other customers. Up to five customers can be selected concurrently for which traffic relationships are shown.

Consultancy Services
DE-CIX professional consulting targets corporate entities, government agencies, and regulatory authorities around the globe. DE-CIX Consultancy Services support the establishment of Internet exchanges in developing regions, to enable local peering in these regions and to further strengthen the global Internet. DE-CIX provided consulting in a variety of locations in 2015. Among them, one important milestone of the consultancy project in collaboration with Angola Cables was achieved in September 2015, when the Luanda-based Angonix Internet Exchange was taken live. This exchange offers local peering for Southwest Africa, as well as connecting to international networks. DE-CIX has extended the contract with Angonix, with the vision of providing continued support into the future.

DE-CIX Consultancy Services provide customers with the relevant set of insights to allow a decision on the best approach for the establishment and management of an IXP, with a focus including the following objectives:

- Assessing the readiness of the dedicated region for an IXP, taking into consideration (benchmarking) the market and the regulatory/legal framework and further IXP developments in the region, providing a gap analysis, SWOT, and risk analysis;
- Providing an Implementation Plan with an appropriate time-line for the establishment of an IXP, consisting of a CAPEX/OPEX outlook based on the recommendations, amended by technical and organizational information.
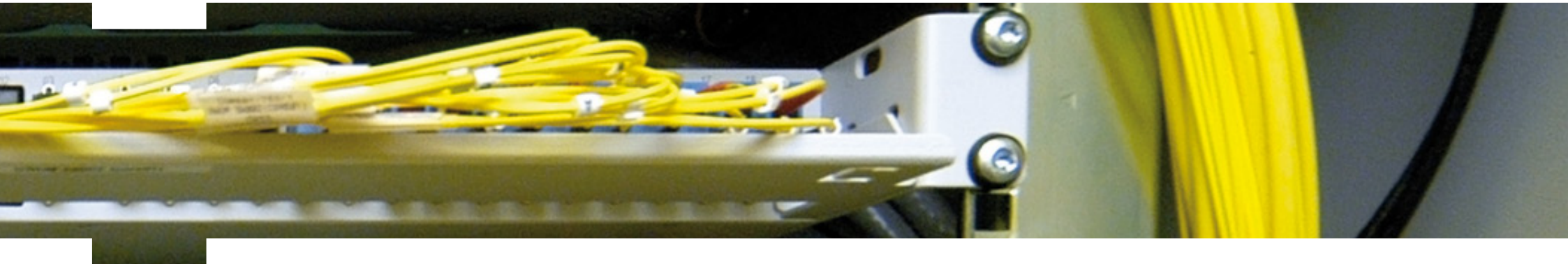
- Providing a Go-To-Market Plan, consisting of a revenue plan, amended by a business development and marketing plan.
- Integrating and operating the IXP in line with the Go-to-Market Plan.

Frankfurt – New York: Peer in both locations with the one port

As announced at the DE-CIX Customer Summit 2015, DE-CIX now offers connected customers in Frankfurt and New York the possibility to peer at our exchange in the other city with their existing port. This service is available on the bandwidths 0.1, 0.2, 0.5, 1, 2, 3, 5, and 10 Gbit/s.

DE-CIX MeetingCenter

The DE-CIX MeetingCenter provides 170 square meters containing the latest in conferencing technology, offering everything required to host a successful event. The MeetingCenter is used for DE-CIX and eco Association meetings and events, and is available for hire to external customers. Customers of DE-CIX GmbH and members of the eco Association are entitled to free usage of the facilities once per quarter.

Colocation at DE·CIX Frankfurt

To peer directly at one of the DE-CIX exchanges, all that is required is equipment in a DE-CIX enabled site. In Frankfurt, it is possible to connect to DE-CIX in twenty data centers. To simplify the process for our prospects of finding a colocation partner, we created a webpage in May 2015 listing colocation providers for the DE-CIX-enabled sites in Frankfurt. This can be updated to include new offers for colocation or housing in one of the DE-CIX-enabled sites in Frankfurt.

Remote peering data base

DE-CIX partners offer access to DE-CIX exchanges from over 300 cities in 50+ countries worldwide. In August 2015 we created a database with the PoPs of our resellers to simplify the search for a reseller. It is possible to search for a city in a specific country or even a specific data center, and find out which resellers offer a connection to DE-CIX Frankfurt or DE-CIX New York. The database is expanded regularly.

Service Insights System

The new Service Insights System went live in September 2015. With this system, customers that are logged in to the customer portal are able to check the overall utilization of their GlobePEER services and detailed peering traffic relationships. The statistics about the overall utilization of a GlobePEER service provide insights into how much IPv4 and IPv6 traffic is sent or received via the customer's port. The detailed traffic relationship statistics allow customers to check how much traffic is exchanged with other customers. Users can select up to five customers for which they want traffic relationships to be shown.

Peering Community Events

DE-CIX was present throughout the year as sponsor and participant at events for the community. This provided good opportunities for DE-CIX staff to be in personal contact with as wide a range of connected customers as possible. As well this, DE-CIX hosted and organized events around the globe for the community.

Events Hosted by DE-CIX 2015

Event	Date	Location
RT München	16.04.2015	Munich
ISP & Carrier Lunch	22.04.2015	Frankfurt
GPF10	27–30.04.2015	Freeport, Bahamas
Sabey Breakfast (Co-Host)	11.08.2015	New York
EPF10	21–23.09.2015	Madrid
DE-CIX Customer Summit/ 20 Years Celebration	30.09.–01.10.2015	Frankfurt & Istanbul
DENOG7	29–30.10.2015	Darmstadt
DE-CIX/ Sparkle Palermo Event	13–14.11.2015	Palermo
UAE-IX Peering Workshop + Cruise	24.11.2015	Dubai
RT Düsseldorf	02.12.2015	Dusseldorf
Christmas Peering Dinner	03.12.2015	Moscow
Holiday Party New York	03.12.2015	New York

Events Sponsored by DE-CIX 2015

International Telecoms Week ITW 2015	10–13.06.2015	Chicago
Datacloud Europe 2015	03–04.06.2015	Monaco
TEX Telecom Exchange	24.06.2015	New York
Peering breakfast	11.08.2015	New York
AfPIF 6	25–27.08.2015	Maputo
Internet Security Days 2015	16–17.09.2015	Bruehl
EPF 10	21–23.09.2015	Madrid
Capacity Eurasia	29–30.09.2015	Istanbul
DE-CIX 20th Anniversary Gala Dinner	30.09.2015	Frankfurt
DE-CIX Customer Summit	01.10.2015	Frankfurt & Istanbul
NANOG 65	05–07.10.2015	Montreal
ENOG 10	12–14.10.2015	Baku
DENOG 7	29–30.10.2015	Darmstadt
Capacity Europe	02–04.11.2015	Paris
RIPE 71	16–20.11.2015	Bucharest
MENOG 16	28.11.–02.12.2015	Tehran

DE-CIX International AG

DE-CIX International: Further expansion of international connectivity

In 2015, DE-CIX can rightly look back with pride on the impressive achievements in the last 20 years. DE-CIX Frankfurt now stands worldwide as an extremely successful German model for the professional management of international data traffic.

This is the case in particular in connection with the new global network infrastructure challenges which are being faced in every region on the planet as a result of the complete digitalization of society and industry and the associated exponentially growing data volumes. It is a global phenomenon that the data streams in the Internet and the required technical infrastructure is branching out more and more regionally in order to more directly connect to growing target markets.

Data and content is moving ever closer to the edge to enable shorter transport routes, resulting in better transmission performance and an even better user experience.

Marseille, Palermo, Istanbul: New regional hotspots

Against this backdrop, DE-CIX International AG also furthered its business activities and, through the establishment of new interconnection platforms in Marseille (France), Palermo (Italy) and Istanbul (Turkey), secured strategic access to further hotspots of international connectivity. All three locations are important hotspots for international network operators and content providers as well as being central landing stations for a range of terrestrial and submarine cable systems for telecommunication and Internet traffic. The new DE-CIX Internet exchanges are set to increase the peering possibilities in the Mediterranean region, and distribute Internet traffic regionally, thus enabling shorter data paths to Africa, the Caucasus, Iran, and the Near East. Turkey, in particular,

already has a very large Internet ecosystem of around 470 Internet service providers at its disposal, and, with 25 percent annual traffic growth, is one of the fastest growing regions in the world.

Large new customers right from the start

As a result, DE-CIX has been able to secure the first partners in the new geolocations, even though the sites were only started in September 2015. By the end of 2015, DE-CIX Istanbul had seven, DE-CIX Marseille four and DE-CIX Palermo two partner agreements, including well-known new customers with especially high data volumes, such as Turkcell Superonline and Netflix Streaming. DE-CIX Services Istanbul will, in the near future, also be available in Ankara, İzmir and Bursa, bringing the service to further urban centers in Turkey.

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Inc.

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Senior Network Engineer
DigitalOcean

DE-CIX New York and Dubai enjoy record growth

2015 was also a time of rapid growth at the peering points in New York and Dubai. In both locations, the number of participants almost doubled: The UAE-IX in Dubai is one of the most important interconnection platforms in the Arabic region by now, with close to 50 network operators and content providers. DE-CIX North America, with more than 100 customers, is one of the top 3 Internet exchanges in the digital world city New York. In addition to this, it was also possible to expand the service offer for connected customers. A new service in the customer portal now offers them, for instance, detailed visual analyses and statistics for the data traffic at the respective peering point.

DE-CIX Dallas: Customers lining up

As the leading Internet nation and the impulse generator for the digital revolution, the United States is in the focus for further DE-CIX International expansion plans in 2016. A new interconnection platform in Dallas, Texas will in future support the development of a healthy ecosystem for interconnection traffic flows in the southern USA, including the increasing Internet traffic from the growth regions Mexico and Latin America. The first large telecommunications and Internet providers, such as the network operator IX Reach, recently signed cooperation agreements with DE-CIX Dallas.

2016: Actively driving worldwide peering activities

In addition to this, further IX locations in Europe and around the world are being evaluated and will add further peering hubs to the DE-CIX location map throughout the current year.

As a sponsor, participant, and organizer of many specialist conferences and information events, DE-CIX International AG wishes to continue to closely accompany current developments in 2016 and sees itself as an important patron of and key expert for the peering industry. We were thoroughly delighted to receive the distinction of the renowned Capacity Award 2015, which has motivated us to continue to actively support and drive the further development of our sector.

Gregor Reinhold
Head of Finances,
CFO

Financial Summary

As a result of a problematic economic situation internationally, and especially in Europe, the overall economic performance in Germany grew by only 1.7 percent in 2015, albeit better than in the previous year's 1.6 percent. According to the forecasts of the German Federal Government's Bureau of Statistics and Destasis, a generally equivalent growth rate is also expected for 2016, of around 1.7 or 1.8 percent, and for 2017 the same or a slightly lower rate.

The Information and Communication Technology sector, however, is influencing the structure and the development of the economy to an ever greater extent, and according to the Federal Bureau of Statistics, this is where services are provided for guaranteeing competitiveness. To achieve this, industry associations are calling for the implementation of the Digital Agenda and broadband and network expansion.

In contrast to other sectors, Destasis has calculated the growth in turnover for the Information and Communication sector for the 2015 financial year at 5.3 percent, while the (German-based) industry association BitKom placed the growth rate at 2.6 percent for telecommunications.

Financial Results
Against this backdrop, DE-CIX benefited from unabated growth in Internet usage in 2015, and as such was relatively unaffected by the national and international economic issues. Revenues rose by around 7 percent in the financial year 2015, which was, however, a reduction from the previous year's 14 percent.

The significant price reduction for DE-CIX services, effective as of 1 January 2015, was responsible for the slower growth in the financial year.

The largest expenses increased in relation to the growth in turnover. These included personnel costs (by 28.5 percent) and a range of operational costs (by 24 percent – adjusted for costs from sale and lease-back transactions to 18.5 percent). The costs for personnel are a result of improvements in staffing in the technical and sales

departments, and are also a consequence of the increasing demand and competition for highly qualified personnel. For other operational expenses, by far the greatest single position, the leasing of the IXP hardware, increased by 57 percent and is (adjusted for costs from sale and lease-back transactions) the major cause of the increases in this area.

Overall, the result from ordinary business activities fell by 33 percent to around €2.1 million, and the net earnings by around 31 percent to just under €1.4 million.

The EBIT reduced by around 32.5 percent in comparison to the previous year to €2.15 million and the EBITDA by 34 percent to €3.7 million.

Forecast

DE-CIX assumes that use of the Internet will continue to grow strongly, and that the established peering system is an integral part of today's Internet infrastructure, above all in Germany and in Central and Eastern Europe. Within industry circles, the name DE-CIX possesses the status of a trademark with the objective of customer-oriented and reliable operations. The company forecasts, on the basis of these factors, that it will be able to maintain a firm and profitable position in the market, even in the event of growing competition.

We forecast a considerable increase in traffic exchanged over the platform. The turnover anticipated for 2016 is in the region of €27.5 million. For the years 2017 and 2018, the figures of €30 million and €33 million are forecast respectively. These include income from services.

Profits of €1.2 million are forecast for 2016, although any sudden developments cannot be taken into account.

Risk Analysis

In the operative area, the goal of maximizing fail-safe operations is being pursued through the geographically dispersed and redundant IXP structure. In the past, positive experience has been gained with equipment operating at the forefront of technical development. Despite this, the threat of disruptions cannot be completely eliminated. However, DE-CIX's record for continuity and availability are unsurpassed in the industry.

Financial flexibility will be maintained as much as possible, despite the high and constant requirements for investment, personnel, rent, and leasing, by the outsourcing of a range of services.

Liquidity is ensured through budgeting and controlling. In general, factoring occurs quarterly in advance, and predominantly in Euros, meaning that there is no overriding currency risk.

Given the large number of foreign customers, there is a relatively high risk of non-recoverable receivables.

Contracts with ISPs have, as a rule, a term of 12 months with automatic extensions, which has a positive short and mid-term effect on planning security.

The management sees growth potential in service contracts for foreign Internet Exchange Points which have recently been founded or are to be founded in the coming year by contractual partners.

Balance Sheet 2015

Assets	2015	2014	Liabilities and Equity	2015	2014
Assets			**Equity**		
1. Intangible Assets	412,253	207,594	1. Authorised Capital	1,000,000	1,000,000
2. PP&E	2,591,212	2,253,320	2. Reserve Capital	1,895	1,895
			3. Profit carried forward	7,874,394	6,766,975
			4. Profit	1,371,123	1,998,420
Current Assets	**3,958,952**	**4,769,887**	**Provisions**	**580,145**	**222,119**
Cash	**5,618,745**	**4,300,175**	**Liabilities**	**2,369,484**	**2,518,555**
Other receivables and prepaid expenses	**615,879**	**976,988**			
Total	**13,197,041**	**12,507,964**	**Total**	**13,197,041**	**12,507,964**

Profit and Loss Account 2015

	2015	2014
Turnover	24,978,229	23,275,261
Decrease in the Inventory	0	6,750
Other Revenues	2,800,520	1,805,180
Cost of Materials	88,747	0
Personnel Costs	4,691,982	3,650,580
Depreciation	1,542,341	1,883,589
Other Operating Costs	19,304,588	16,344,379
Interest earned	697	12,918
Interest paid	16,629	13,001
Net Operating Income	**2,135,159**	**3,195,060**
Tax	764,036	1,196,640
Profit	**1,371,123**	**1,998,420**

Ivo Ivanov
Head of Strategic Development
DE-CIX International AG

Strategic Outlook

Background
The strategic approach of DE-CIX is to support the creation of healthy interconnection ecosystems.

A widely-distributed carrier and data-center-neutral Internet exchange that engenders a robust ecosystem – regardless of the type of colocation partner the networks have chosen – is a crucial factor for the creation of successful and strong digital hubs. Network operators can use the DE-CIX interconnection fabric to create redundant and resilient solutions for their own network strategy.

DE-CIX Frankfurt is the largest peering platform in the world for data throughput. Frankfurt has become the telecom capital of Europe, with one of the strongest concentrations of data centers, carriers, and telecommunications businesses in the world. This is confirmation of the success of the DE-CIX strategy.

This approach is important to support the growth of ecosystems in other regions around the globe that have future potential in the area of telecommunications.

DE-CIX's approach is particularly disruptive for the North American market, forging alternatives for interconnection on a data center and carrier-neutral foundation.

Supporting and driving digital transformation
A new decade has started in the interconnection world. This means that verticals, especially enterprises, are demanding new, secure solutions for dealing with massive data volumes, as well as for the adaptation of all of their processes to digital systems. Digital transformation involves digitalization of the entire value chain for all entities, from the start-up to the established blue-chip.

The customer landscape is changing, and with it the demands. Customers of interconnection services require a wide range of services, including public/private peering, one-to-one, secure connectivity to cloud, and global reachability and presence, the latter being driven by network operators that are subject to internationalization. An increasing number of DE-CIX customers are global companies that operate on multiple continents.

Enterprises in the process of digital transformation are dependent on the support of technology and interconnection solutions. This need for interconnection is coming closer to the edge – this means that enterprises are getting closer to the infrastructure layer, and DE-CIX prides itself on being a world-class provider for their growing demand for interconnection services.

From public peering point to global inter-connection fabric
It is our mandate to support the digital transformation process. In the same way that DE-CIX supported ISPs to interconnect and start "peering" in the early days, we now have to support the new environment of digital transformation – encompassing a much broader target group – with an "interconnection fabric". This is good for our ecosystem and for the robustness and health of the Internet itself.

Historical peering is attractive mainly to ISPs, but the market for interconnection services is evolving rapidly.

We will provide our ISPs with a new variety of services that enables them to optimally support their end customers. The services will include direct and indirect connections for different-sized enterprises – a one stop shop for interconnection services. In so doing, we will enlarge the spectrum of services our core customers will provide to their end customers.

Paving the way to the next generation of IXP
DE-CIX has begun developing and providing new services to meet the demands of the changing market. The first of these is the remote peering VLAN between Frankfurt and New York, which was initially announced in late October 2015. Other examples are interconnection services relating to cloud connectivity and customized security. We will continue to predict changing demand for different interconnection needs and to offer a variety of interconnection approaches.

Alongside excellent connectivity, the security of their investment is important to our customers – ensuring the sustainability of its relevance. Maintaining the relevance of our services is only possible by meeting the variety of demands on the market for different interconnection solutions. Enabling customers to use one platform for different interconnection solutions will create customer satisfaction by empowering them to more effectively use the infrastructure they have deployed with DE-CIX. We will retain the meet-me ecosystem for all public peering needs, adapting it to include a bundling of interconnection services.

An Internet exchange of the future will, of course, continue to provide traditional peering, but has to develop itself into a revolutionary fabric that offers maximum flexibility and a robustness that meets the demands of the coming decades.

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