

The Globalization of Interconnection Tutorial

Definition

In the telecommunications industry, "interconnection" refers to the establishment of electronic linkages between service providers so that they can conduct business transactions electronically. In short, interconnection is e-commerce or business-to-business trading between and among carriers.

Overview

In a competitive marketplace, there are a number of reasons why service providers need to interconnect with each other:

- New entrants need access to the networks of incumbents so that they can resell services.
- Competitive voice, data, and wireless carriers need access to "last mile" facilities to deliver services to end users.
- All carriers need access to each other's back-office systems to fulfill number portability mandates and to exchange the forms and messages involved in fulfilling customer orders.

Thus, in the telecom industry, interconnection or e-commerce is not just a way to make business relations easier. It is, literally, the key to competition. Without those linkages, competition would simply not be possible.

On a national level, interconnection is complicated enough, involving a tangled web of relationships among different types of providers. Interconnection on a global scale is further complicated by diverse languages, cultures, markets, regulatory environments, and technical idiosyncrasies. That's why the "technique" used to achieve interconnection is all-important. That technique becomes either the facilitator of or obstacle to competition and the spread of communications services around the world.

This tutorial will clarify the business case for global interconnection by explaining the evolution of interconnection in the United States, identifying the global drivers of interconnection, explaining how an interconnection clearinghouse works and why it is the most flexible and workable approach, illustrating how interconnection with and without a clearinghouse works for actual companies, and describing a practical vision for achieving interconnection on a global scale.

Topics

1. Interconnection in the United States: A Brief History
2. The Global Drivers of Interconnection
3. The Emergence of a Workable Approach to Interconnection
4. Interconnection Is about Real People, Real Companies
5. Global Vision for Interconnection

Self-Test

Correct Answers

Glossary

1. Interconnection in the United States: A Brief History

The U.S. experience is an apt template from which to view the state of telecommunications around the world. As you will see later, the principal drivers of interconnection are largely the same all over the world, and among the world's telecom markets, the United States is simply further along in its efforts to address the interconnection challenge.

In the United States, access services—when access providers (typically incumbents) provide access from their switches or from end-users' premises to interexchange carriers (IXCs)—were actually created in 1986. Access services constituted an early form of interconnection. But the real dawn of telecom interconnection in the United States came 10 years later with the passage of the Telecommunications Reform Act of 1996. The Act deregulated most sectors of the U.S. communications market, allowing phone companies, broadcasters, and cable operators to enter each other's markets.

To enter the marketplace and compete freely, competitive local-exchange carriers (CLECs) could not possibly recreate the incumbents' public networks, which were already wired to virtually all homes and businesses throughout the country. Thus, the Act stipulated that, for a free market to thrive, incumbents had to give

competitors access to those networks (for a price negotiated between the trading partners).

A Disconnect between Theory and Practice

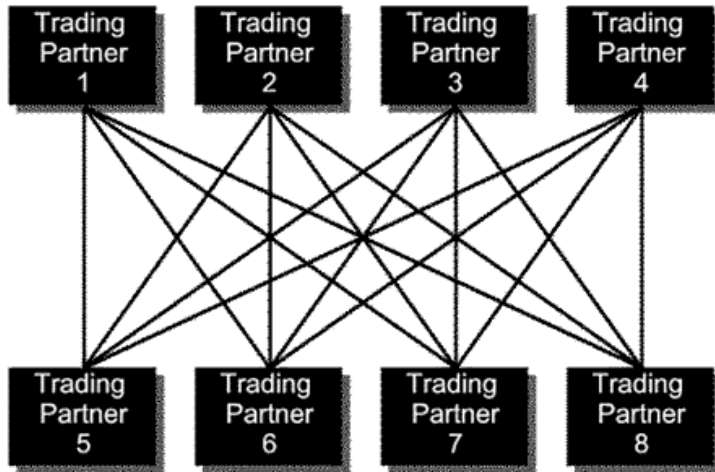
It sounds simple enough: new entrants set up electronic connections—so called gateways—to each of their incumbent trading partners and start the flow of messages, preorder information, and service orders. In reality, interconnection proved to be a financial and technical nightmare. In fact, the challenge of interconnection, more than any other factor, limited service providers to doing business on a regional basis with just one or two partners, rather than on a national basis.

Here's why. First, to deliver nationwide service, a new entrant had to establish not one connection but multiple connections—a separate electronic gateway to each major U.S. incumbent. Second, out in the marketplace the wholesaler (incumbent) and retailer (competitor) roles are not clear-cut. Some incumbents and competitive providers are playing both roles, resulting in a tangled web of business relationships. For example, some incumbent local-exchange carriers (ILECs) have moved into the long-distance market, which means that they are wholesalers when it comes to local services and retailers (new entrants) in the long-distance market.

If that sounds confusing, just wait; it gets better. Today, it is not just voice carriers doing business with each other. The market is growing increasingly crowded and diverse with voice and data providers operating over fixed-line, mobile, satellite, cable, and Internet protocol (IP) networks.

As a result, with individual gateways to each partner, it took enormous amounts of time and money, as well as added staff, to manage the comings and goings of preorder, order, maintenance, provisioning, and billing messages. It was also enormously difficult for competitive carriers to keep up with each wholesaler's unique and constantly changing interfaces, data protocols, and order-related business rules. Consider that a single electronic "request" to any carrier can invoke as many as 2,000 to 3,000 business rules.

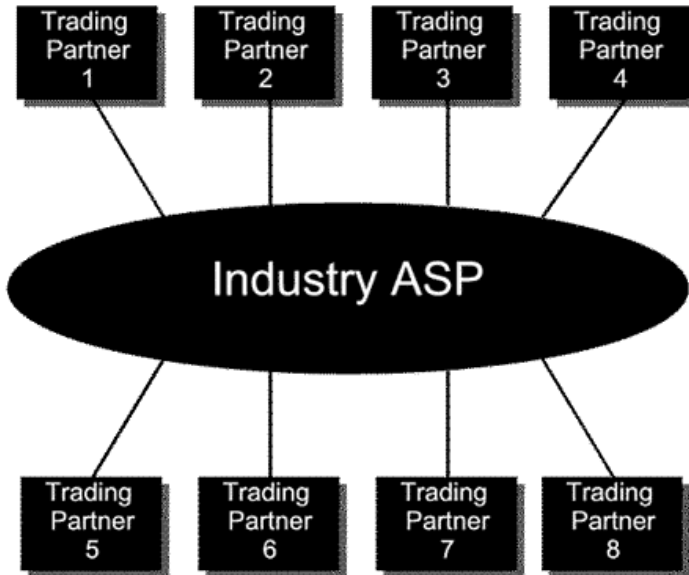
Figure 1. The Search for a Better Way



It is no wonder that early attempts at interconnection were fraught with frustration, cost overruns, and service-related errors and delays. And it is little wonder that the vision of nationwide interconnection (read: competition) remained stymied. The Telecom Act of 1996 originally projected that 10 percent of the 190 million U.S. access lines would be competitively owned by the end of 1999. Only 4 percent were competitively owned at the end of 1999.

This situation demanded another approach—one that could simplify, automate, and reduce the escalating costs involved in maintaining many-to-many connections.

Figure 2. The Clearinghouse Solution



2. The Global Drivers of Interconnection

The Strategy

While there are regional variations in timetables, specific regulatory directives, and technological penetration, communications and interconnection around the world are, for the most part, being driven by four universal trends.

Deregulation or Market Liberalization

Countries on every continent are abandoning the old models in which communications were controlled by state-run monopolies. Instead, markets are being opened to competitive carriers—throughout Europe they are known as other licensed operators (OLOs)—and incumbents are being forced to modernize, compete for customers based on price and service quality, *and* grant network access to competitors.

New Regulatory Mandates

To support competition; voice, video, and data convergence; and broad access to advanced services, regulatory bodies are issuing mandates directing carriers to participate in number portability, carrier preselection, emergency services such as enhanced 911, and network unbundling—all of which require carrier-to-carrier interaction.

Digital Subscriber Line (DSL) Explosion

Skyrocketing demand for data and Internet access is a global phenomenon that is driving the adoption of DSL technology, which turns traditional voice networks into data highways. It has also spawned a new industry of data local-exchange carriers (DLECs)—another segment of competitors needing "last mile" access to end users.

Table 1. Installed Base of Access Network Lines (000s) for Beginning of Each Year Shown

	1999	2000	2001	2002	2003	2004	2005
World Totals	76	1,136	6,757	14,449	22,528	36,963	65,529
Total of U.S. and Canada	38	608	2,839	8,993	12,938	18,926	31,108

Total of Europe	29	354	1,411	2,804	5,343	8,723	12,773
Total of South America, Central America, and the Caribbean	0	0	40	141	311	1,096	2,869
Total of Central Asia	0	28	147	181	328	628	1,424
Total of Asia-Pacific	9	146	1,314	2,266	3,436	6,723	14,047
Total of Middle East and Africa	0	0	6	64	172	867	3,309

Source: OVUM Ltd. & Yankee Group

Proliferation of Players

The telecom industry is no longer populated by a homogeneous community of voice carriers. Carriers today represent a mix of players that grows bigger and more diverse every day thanks to the demand for and advances in wireless technologies and data services.

These drivers do not just make an airtight case for interconnection. But just as we have seen in the United States, they also make the case for an approach to interconnection that can handle a multitude of diverse players operating on national, regional, and global scales.

3. The Emergence of a Workable Approach to Interconnection

The answer to the problem of nationwide and global interconnection has emerged in the form of the interconnection application service provider (ASP). The interconnection ASP serves as a centralized, automated clearinghouse for carrier communications and transactions.

This type of electronic clearinghouse is a market-tested concept that has proven invaluable to other industries. For example, in the banking industry, it has accelerated and simplified the processing of billions of checks, which must be received from and routed to thousands of different banks. Similarly, in the telecom industry, service providers of all types and sizes need just one link into the clearinghouse, rather than multiple links to each of their trading partners. The clearinghouse or ASP receives all messages and order and preorder information, automatically translates them to the right protocols, and directs them to the appropriate carriers.

The business rules of all participating trading partners are programmed into the clearinghouse, where they are updated as soon as a carrier's issue changes. Service providers can access the ASP via traditional gateways or the Internet.

There is nothing theoretical about this type of service. It is already operating in the United States, where it has made nationwide interconnection simple, efficient, and virtually error-free.

4. Interconnection Is about Real People, Real Companies

It's one thing to talk about interconnection but another thing to understand how it affects actual service providers and their customers.

Start Local

Consider a typical U.S. case prior to the emergence of the first clearinghouse. A CLEC establishes an electronic, point-to-point gateway to an ILEC to resell local services. Although the industry has issued local service ordering guidelines (LSOGs) in an attempt to standardize the forms and procedures used to process orders, every ILEC interprets those guidelines a little differently, and every ILEC's service portfolio has variations. So the CLEC must be sure that it knows and follows that ILEC's rules for how the customer's address must be recorded, whether abbreviations are allowed, whether there are specific codes for certain entries, and so on. Remember, every order invokes 2,000 to 3,000 different stylistic and procedural rules, which are constantly being changed and updated. Getting the slightest detail wrong results in a rejection and requires the CLEC to start the process over. For each and every reject, ILECs charge CLECs a penalty of \$40 to \$70.

In the United States, each transaction completed via a point-to-point gateway has taken, on average, four tries before being successfully completed. Given the costs of rejections and general maintenance of rules, interfaces, and communication protocols, over a two-year period it could easily cost a CLEC more to maintain a gateway than it originally cost to build it. And that does not factor in the "price" paid in end-customer annoyance when a seemingly simple order takes days or weeks to complete.

Now Go Global

You run a DLEC that is touting worldwide DSL service for small business. A start-up U.S. import company signs up for service to facilitate its budding relationships with exporters in Belgium, Japan, and Mexico. You first move to establish your

client's DSL service in the United States. After several rejections, because digits in the phone number were transposed by a customer service representative and the client's street name was entered as "Road" instead of "Lane," U.S. service is established. But your work has just begun.

Similar gateways and communications are required with incumbents in each of the countries in which your client does business. For each country, ordering data must be transmitted in the native language and must adhere to each service provider's order-related conventions and rules. Again, after working through the proper translations and formats and correcting a series of rejections you finally establish service in Belgium and Japan. But just as you begin working on Mexico, a notice arrives from Japan informing you that installation of a new operations support system (OSS) has streamlined the Japanese provisioning process, and, by the way, requires you to resend your customer data in the new format. You must inform your customer that service to Japan will be held up a little longer while you comply with the new Japanese rules. Meanwhile, you are putting through the Mexican order, when Belgium lets you know that it is updating its security firewall, requiring additional identifying information.

When service is finally up and running in the United States and all three overseas locations, that one client's account will still require continuous "care and feeding" to ensure uninterrupted quality of service.

This is not science fiction. It is a tremendous operational challenge to deliver on one promise to one little customer. Expand that customer's needs even a little—perhaps adding just a few more countries—and the difficulty increases exponentially. And there is no telling how long it will take to recover the up-front costs that you inevitably incur in provisioning—related penalties, staff, and time—assuming that your client doesn't leave in frustration part of the way through the process. Don't forget, every extra day that it takes to make good on your customer's order means loss of business for that company.

An interconnection ASP takes virtually all provisioning details out of the carrier's hands, freeing up time and resources that can be devoted to that carrier's core business. With the ASP/clearinghouse, your customer's multifaceted request for international DSL boils down to one simple order. All the "work" is handled automatically by the clearinghouse.

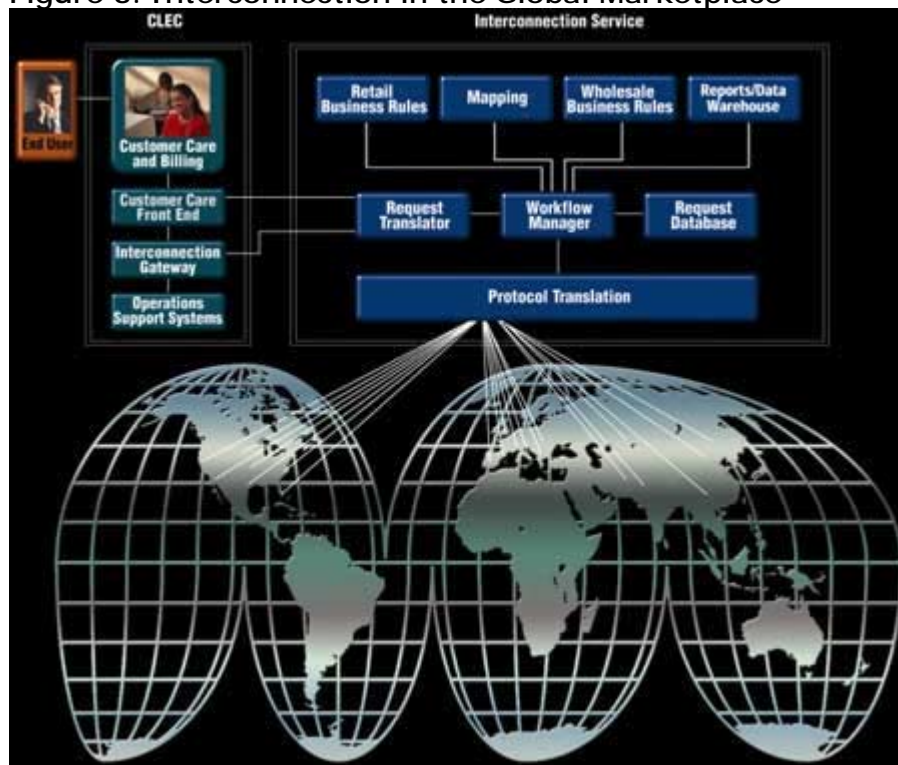
5. Global Vision for Interconnection

Just as they have in the United States, interconnection ASPs can deliver the same benefits of simplicity, standardization, scalability, and efficiency on a global scale. ASPs can level the playing field for service providers the world over by doing the following:

- Providing "one way in, many ways out"—the ability to connect with infinite partners and send orders to multiple locations via one connection
- Handling and maintaining all translations, rules, protocols, and interfaces—insulating each participating service provider from these costly, time-consuming responsibilities
- Scaling with each participant's business—offering pay-as-you-grow convenience by instantly accommodating a service provider's increase or decrease in business.

The most plausible model for global interconnection is one that involves linking service providers around the world via several, interconnected, regional ASPs.

Figure 3. Interconnection in the Global Marketplace



This vision is workable using currently available technology and expertise. It is also likely to become a reality, given the strong and growing momentum from both carriers and regulators for a global answer to the interconnection challenge. Although we often associate regulators with business *restrictions*, today's telecom regulators are focused squarely on *deregulation*—removing barriers to free trade to encourage unfettered competition.

The more telecom markets open up to competition, the more urgent the need for interconnection.

As the International Telecommunication Union (ITU) reminds us, we live "in an age that places increasing importance on 'any-to-any' interconnection, that is, the ability of any network operator to establish connectivity with any other operator." For this reason, says the ITU, "regulators and market players from around the globe consider interconnection regulation to be the single most important issue in the development of a competitive marketplace for telecommunications services."¹

Self-Test

1. The Telecommunications Act of 1996 marks the dawn of interconnection in the United States because _____.
 - a. it deregulated the U.S. market and ordered incumbents to grant access to their networks
 - b. it defined the first technical requirements for electronic gateways
 - c. it legislated valuable tax breaks for carriers that interconnected
 - d. it guaranteed minimum market shares to incumbents that opened their networks

2. Point-to-point gateways hinder the ability of CLECs to do business with multiple carriers because _____.
 - a. CLECs have to erect a separate gateway to each trading partner
 - b. each incumbent requires its trading partners to adhere to its proprietary business rules, interfaces, and protocols
 - c. gateways can require exorbitant amounts of time and money to maintain
 - d. all of the above

3. Framers of the Telecommunications Act of 1996 achieved their vision of having 10 percent of the 190 million U.S. access lines competitively owned by 1999.
 - a. true

¹Trends in Telecommunication Reform 2000–2001: Interconnection Regulation

- b. false
4. Besides deregulation and market liberalization, global regulatory mandates for such services as number portability and enhanced 911 strengthen the case for interconnection.
- a. true
- b. false
5. There are a variety of methods available for achieving interconnection, all of which can be made to interoperate in the global arena. The key to telecom competition is not which methods carriers choose; it is that they act to interconnect in the first place.
- a. true
- b. false
6. An interconnection clearinghouse or ASP simplifies interconnection and levels the playing field for all types of service providers because _____.
- a. it operates on a flat-fee structure
- b. it requires multiple connections to trading partners, but all of those connections are directed into the same hub
- c. it requires one connection and provides automatic transmission of messages to the right trading partners
- d. it gives CLECs a competitive advantage over some incumbents
7. Linking regional ASPs to achieve global interconnection is an extremely promising vision that is not possible today but will be possible in the near future when some advanced technologies, now in development, are available.
- a. true
- b. false
8. Exploding demand for DSL is identified as another driver of interconnection because _____.
- a. to operate effectively, DSL technology requires the combined computing power of more than one carrier
- b. the new and growing breed of data carriers needs "last mile" access

- c. in the face of mounting service problems, regulators want it to be easy for customers to switch carriers
 - d. with this technology, customers of different providers can share a DSL
9. If a CLEC were to get even one detail of an ILEC's 2,000 to 3,000 business rules wrong, their order would be rejected. For each and every time this occurs, the CLEC is subject to a penalty of \$40 to \$70 by the ILEC.
- a. true
 - b. false
10. Given the costs of rejections and general maintenance of rules, interfaces, and communication protocols, over a two-year period it can easily cost a CLEC more to maintain a gateway than it cost to build it.
- a. true
 - b. false

Correct Answers

1. The Telecommunications Act of 1996 marks the dawn of interconnection in the United States because _____.
- a. it deregulated the U.S. market and ordered incumbents to grant access to their networks**
 - b. it defined the first technical requirements for electronic gateways
 - c. it legislated valuable tax breaks for carriers that interconnected
 - d. it guaranteed minimum market shares to incumbents that opened their networks
- See Topic 1.
2. Point-to-point gateways hinder the ability of CLECs to do business with multiple carriers because _____.
- a. CLECs have to erect a separate gateway to each trading partner
 - b. each incumbent requires its trading partners to adhere to its proprietary business rules, interfaces, and protocols**

c. gateways can require exorbitant amounts of time and money to maintain

d. all of the above

See Topic 4.

3. Framers of the Telecommunications Act of 1996 achieved their vision of having 10 percent of the 190 million U.S. access lines competitively owned by 1999.

a. true

b. false

See Topic 1.

4. Besides deregulation and market liberalization, global regulatory mandates for such services as number portability and enhanced 911 strengthen the case for interconnection.

a. true

b. false

See Topic 2.

5. There are a variety of methods available for achieving interconnection, all of which can be made to interoperate in the global arena. The key to telecom competition is not which methods carriers choose; it is that they act to interconnect in the first place.

a. true

b. false

See Definition and Overview.

6. An interconnection clearinghouse or ASP simplifies interconnection and levels the playing field for all types of service providers because

_____.

a. it operates on a flat-fee structure

b. it requires multiple connections to trading partners, but all of those connections are directed into the same hub

c. it requires one connection and provides automatic transmission of messages to the right trading partners

d. it gives CLECs a competitive advantage over some incumbents

See Topic 3.

7. Linking regional ASPs to achieve global interconnection is an extremely promising vision that is not possible today but will be possible in the near future when some advanced technologies, now in development, are available.

a. true

b. false

See Topic 3.

8. Exploding demand for DSL is identified as another driver of interconnection because _____.

a. to operate effectively, DSL technology requires the combined computing power of more than one carrier

b. the new and growing breed of data carriers needs "last mile" access

c. in the face of mounting service problems, regulators want it to be easy for customers to switch carriers

d. with this technology, customers of different providers can share a DSL

See Topic 2.

9. If a CLEC were to get even one detail of an ILEC's 2,000 to 3,000 business rules wrong, their order would be rejected. For each and every time this occurs, the CLEC is subject to a penalty of \$40 to \$70 by the ILEC.

a. true

b. false

See Topic 4.

10. Given the costs of rejections and general maintenance of rules, interfaces, and communication protocols, over a two-year period it can easily cost a CLEC more to maintain a gateway than it cost to build it.

a. true

b. false

See Topic 4.

Glossary

ASP

application service provider

CLEC

competitive local-exchange carrier

DLEC

data local-exchange carrier

DSL

digital subscriber line

ILEC

incumbent local-exchange carrier

IP

Internet protocol

ITU

International Telecommunication Union

IXC

interexchange carrier

LSOG

local service ordering guidelines

OLO

other licensed operator

OSS

operations support system