

View Point



Future of Travel & Tourism Industry with the adoption of Web Services in Electronic Distribution

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Abstract

The usage of internet has significantly enhanced the role of electronic means in distribution of travel inventory. Online players taking part in electronic distribution include travel sites, GDSs, online travel agents etc. In spite of the significant role of internet in offering streamlined front-end for travel reservations, the problems of interoperability, rate anarchy, high costs and enhanced role of centralized GDSs still plague the electronic distribution process of travel inventory.

Web Services, the latest trend in distributed computing shows promise in resolving the interoperability issues. Here we examine the role web services can play in streamlining electronic distribution of travel inventory. Further, we present the futuristic scenario of electronic distribution in travel, highlighting the changes web services can bring including trends like disintermediation, lowered cost of transactions, seamless integration and new generation travel intermediaries. Towards the end, we chart out a detailed roadmap for the different players in the industry in embracing web services to enable realize the futuristic scenario.

Executive Summary

The usage of internet has significantly enhanced the role of electronic means in distribution of travel inventory. In spite of the significant role of internet in offering streamlined front-end for travel reservations, the problems of interoperability, rate anarchy, high costs and enhanced role of centralized GDSs still plague the electronic distribution process of travel inventory.

Web Services, the latest trend in distributed computing, offer the benefit of standardized communication between applications and can be used in resolving the interoperability and other issues plaguing travel distribution. Here we examine the role web services can play in streamlining electronic distribution of travel inventory. Further, we present the futuristic scenario of electronic distribution in travel, highlighting the changes web services can bring including trends like disintermediation. We believe owing to the growing use of web services and standardization pursued by Open Travel Alliance (OTA) in travel distribution following changes would happen in future:

- Disintermediation
- Standardized Content
- Changes in the roles of GDS
- Value Added Service providers with stronger cross industry alliances
- Emergence of newer players, like consortiums of regional players and regional tourism boards

Towards the end, we chart out a detailed roadmap for the different players in the industry in embracing web services to enable realize the futuristic scenario painted.

Traditional Electronic Distribution in Travel and Hospitality Industry

Distribution of inventory through electronic and other channels has been one of the highest priorities of the travel industry. Electronic distribution entails selling or reserving the units of inventory to passengers. Travel inventory has certain peculiar characteristics which can be described as follows: -

- Buying means reserving the right to use the unit of inventory by the customer
- At the time of purchase customers and the service providers are separated by distance
- Usually the purchases are made in advance of the actual consumption of the service.

The above characteristics make travel inventory most suited for electronic distribution corroborating the fact that it has been prevalent in travel industry since 1960s.

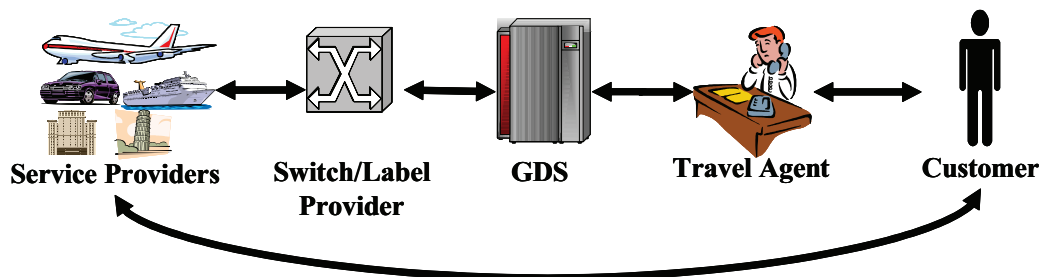


Figure 1 Traditional Travel Inventory Distribution

As shown in Figure 1 traditionally travel distribution has six key players namely:-

- Service providers
- Label providers
- Switch companies
- Global distribution systems (GDS)
- Travel agent
- Customers

At the heart of the travel distribution are the GDSs. GDSs host static information and provide access to availability of inventory, and rates of various service providers. This data can be queried and accessed by the travel agents from around the world subscribing the GDS. They can reserve the inventory. Traditionally, Central Reservation Systems (CRSs) of individual service providers like car rental companies, hotels, cruise lines and even railway companies have lacked the capability of reaching their worldwide customer base. To overcome this problem, the service providers have had to rely on the GDS companies and their worldwide network of travel agents. However, due to disparate technologies used by the service providers and the GDS companies, connecting directly to GDS has been difficult for most smaller and independent service providers.

Label providers became the most common intermediary in the travel industry where the smaller hotel chains or car rental companies lacked the ability to link their CRSs to the GDSs. Label Provider offered services to host the rate & availability of smaller regional players and interface them with the GDSs through switches.

'Switch' is basically a proprietary application, which carries out the critical task of interfacing individual CRSs of the service providers or that of label providers to the GDSs. The switch allows the service provider the access to sell their inventory real time on the GDS. There are two main switch companies namely THISCO and Wizcom. Switch companies normally charge in combination of annual fees and transaction fees to the service providers for the use of their proprietary application. This alleviates the service providers / label providers from maintaining the interfaces with the GDSs.

Travel agents have traditionally acted as key intermediaries in the travel distribution. Travel agents with the access to the GDSs have had the knowledge about the available alternatives and means to contact the service provider to make the necessary bookings. As per one estimate published in (TixTravel, 2003), travel agents book 80% of all air travel, 30% of all hotel reservations and 95% of all cruise reservations. Travel agents also offer wide ranging services ranging from selling travel insurance to providing corporate T&E expense management solutions. With the dwindling and at times disappearing commission income travel agencies have been under pressure to change their revenue model from charging commissions from service providers to charging service charges to the end customers.

Traditionally customers have had two possible alternatives to reserve the required number of seats, cars, hotel rooms or berths (inventory) for the required duration by directly approaching the service provider or to use the services of travel agents. Since the customers and the service providers are separated by distance, awareness of alternatives for convenience and efficiency in the process of identifying and booking itineraries, traditionally, the customers have preferred making through a qualified travel agents with the requisite expertise and ability which is evident from the estimates mentioned in (TixTravel, 2003). Only extremely loyal customers or customers who are aware about the available alternatives and varying prices in the market would book directly with the service providers.

Current Trends in Electronic Distribution

In the current distribution scenario GDS continue to be at the heart of the travel electronic distribution. Currently there are four major GDS companies as mentioned in Table 1. Over last five years, the four GDS companies, in total, have continuously expanded their network of travel agents across wider geographies, alongside adding more and more service providers to sell their inventories through the existing network (See Figures 2 and 3).

Table 1 Key GDS Players

Name	Founded in	Started by / Owned by	Approx No. TA Locations Year '02	Region
Amadeus	1987	Air France, Iberia, Lufthansa, and SAS	57,000#	Mainly Europe, Mid East, North Africa & Asia Pacific
Galileo	1993*	Founded by a consortiums of 11 major North American and European airlines led by United Airlines. Currently owned by Cendant Corporation	47,000	Global presence very strong in the US and Western Europe
Sabre	1976	American Airlines. Currently a separate entity owned by AMR corporation	60,000	Global presence very strong in the US and Asia Pacific
Worldspan	1990	Founded by Delta, TWA, and North West Airlines. Currently being sold to Transaction Processing Corporation.	20,000	Mainly in the US and Europe

* Apollo which started operations in late 1970's by United was merged into Galileo in 1993

Source: (Samipatra Das, October 2003)

!! Sources (Amadeus Web Site, 2003; Galileo Web Site, 2003; Sabre Web Site, 2003; Worldspan Web Site, 2003)

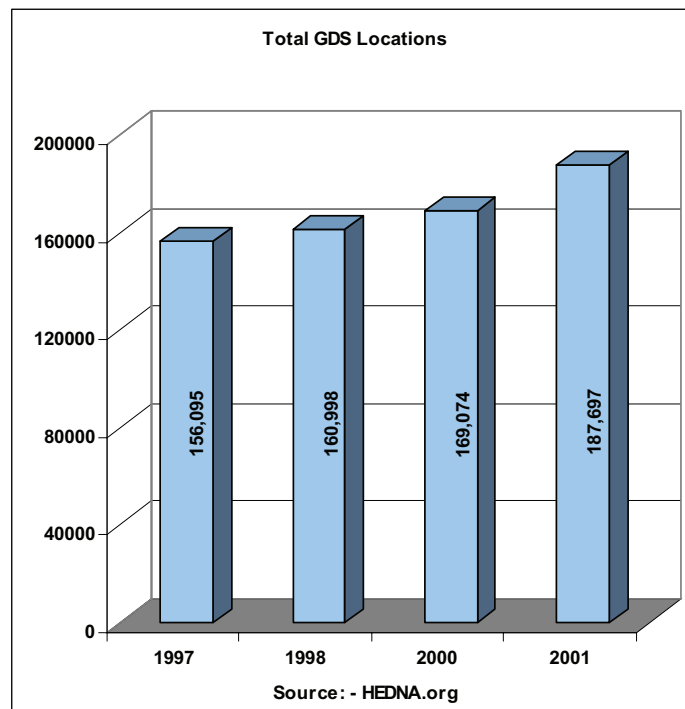


Figure 2 Total number of GDS client installations

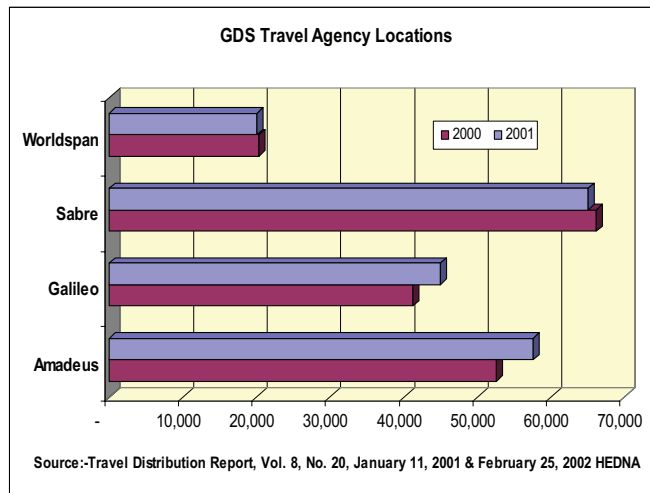


Figure 3 Individual GDS travel agency locations

In a survey conducted by Forrester Research (Harteveldt Henry H., Renyi Christopher & Gazala Michael E. [HRG], October 2001), it was revealed that the GDS is and will remain as the most important channel of distribution for airlines, hotels and car rental companies alike. For some of the airlines which participated in that survey, upto 70% of revenues came via the GDS whereas, some of the hotels and car rental companies got 44% and 43% respectively, of their total sales through the GDSs. However, by year 2006, the report estimates that the percentage share of service providers' sales through GDSs is likely to decrease as follows: Airline 51%, Hotels 34% and car rentals 28%.

Internet has fundamentally changed the traditional travel distribution scenario. Internet provides a great avenue for service providers to educate potential buyers and to sell their inventory directly to the customer who are geographically separated and not necessarily aware of the alternatives. Internet in the Travel distribution has spurred disintermediation at all levels of the traditional distribution chain (see Figure 4).

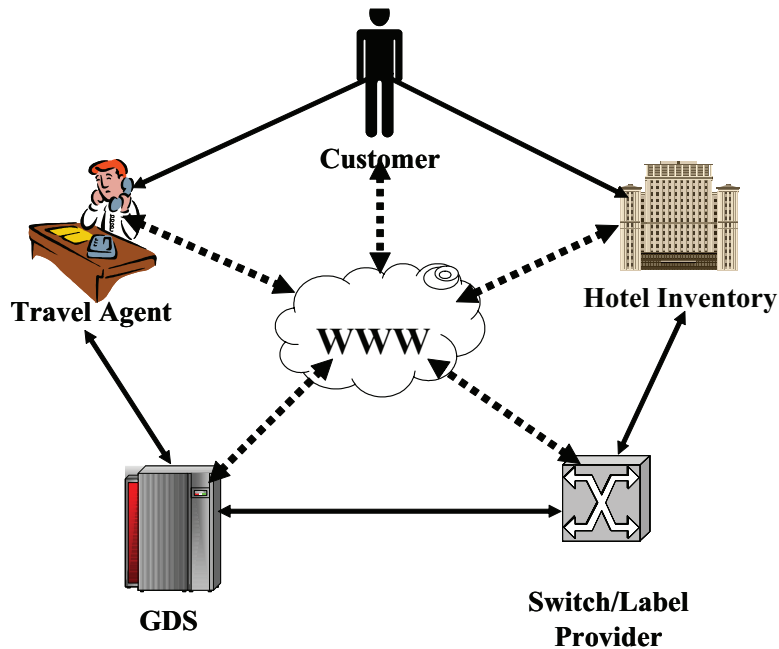


Figure 4 Players in Electronic Distribution in Travel and Hospitality

With internet the service provider can by-pass switch, label provider, GDS and travel agents to reach directly to the new customers. However, Internet also allows the GDS companies, label providers and even the traditional brick & mortar travel agents to host websites directly which access their connections and provide the services previously offered by offline travel agents. Table 2 highlights how some of the key players in the travel distribution chain have jumped in the fray with their own travel web sites.

Table 2 Key Players in the distribution chain

Web site	Related to	Traditional business
Travelocity.com	Sabre	GDS
OneTravel.com	Amadeus	GDS
Travelweb.com	Pegasus	Label Provider
Opodo.com	Consortium of major European Airlines	Airline
Orbitz.com	Consortium of major US Airlines	Airline
Hotels.com	Consortium of major hotel chains	Hospitality

After a decade of existence acceptance of internet is still growing. According to (Jupiter Research, 2002) the number of people in the US who have bought travel over the internet is likely to double from 18.6 million in year 2001 to 38.6 million in year 2007. Figure 5 shows the growth in internet usage by the travel buyers.

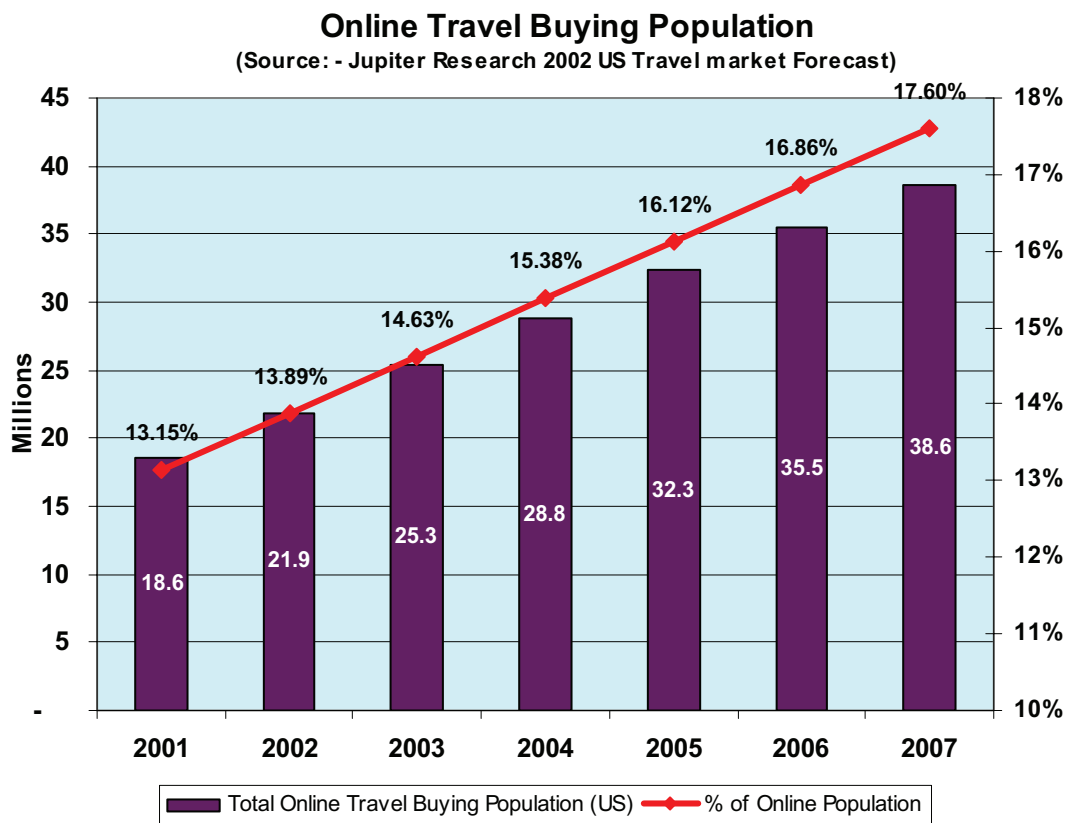


Figure 5 Online Buying Population Statistics

In last few years, despite the setbacks of 9-11 and other adverse macro economic and geo-political factors online travel companies have managed to continue their bull run. The share of internet in travel distribution has continued to grow steadily. The following chart demonstrates that across the industry segments Internet is likely to be the most dominating channel of distribution. The share of internet is estimated to double from 11% share in year 2001 to approx 22% in year 2007 (Figure 6).

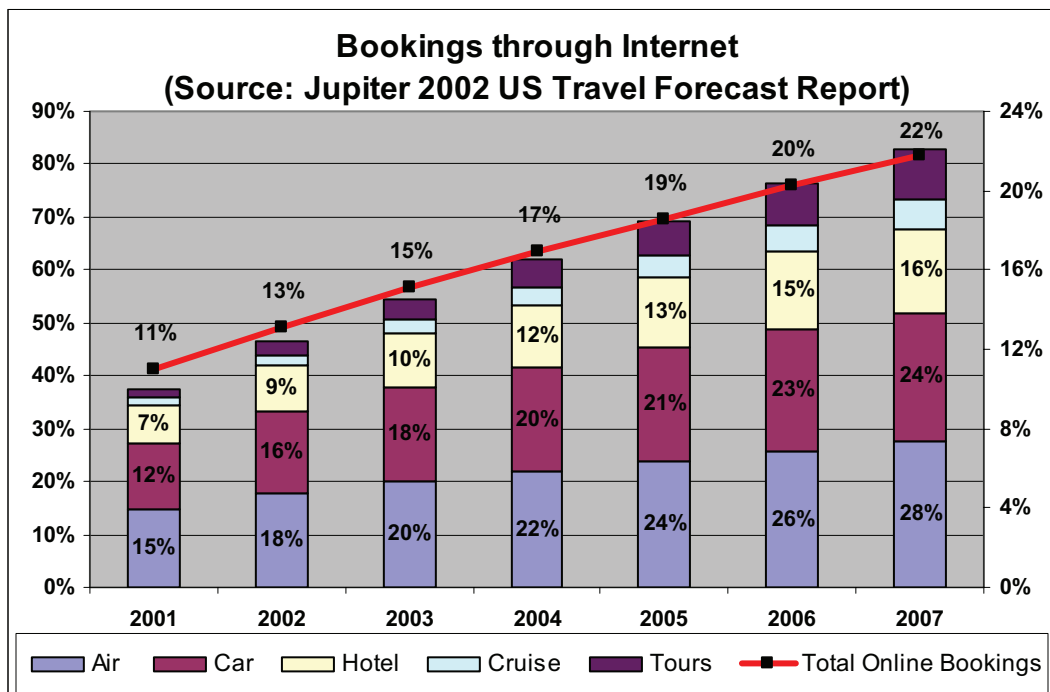


Figure 6 Role of Internet in Electronic Bookings

In the current scenario, internet has been the most suitable channel to make bookings for simpler and straightforward itineraries or when only one service provider is involved in the itinerary. Internet provides the buyer an option to research & compare the alternatives for the features, the product offering and the price. However, most internet sites today including Expedia and Travelocity use the backend of the GDS to find the alternatives and make the bookings. In that sense the internet sites are online or do-it-yourself travel agencies.

Business models of internet based agencies are now evolving from being a simple agent selling one type of inventory to being a merchant of the different types of inventory and to sell packaged products. In the agent model the web site would earn their income in the form of commission for selling the inventory of the service provider. Whereas in the merchant model sites such as Expedia are now negotiating special rates and allocation with the service providers and offering those to their customers along with other complementary services and thus making the margins between the rate paid by the customer and the rate payable to the service provider or in the form of service fees levied directly to the customer. As a result of the above trends the simple travel distribution value chain exhibited in (Figure 1) has become complex and multi-dimensional. There are multiple types of channels drawing their information from different sources.

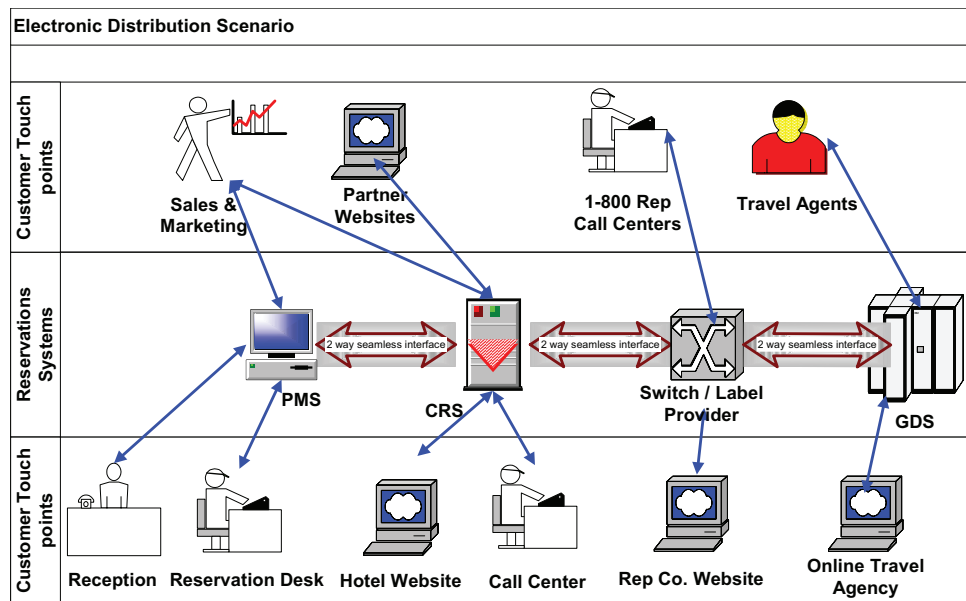


Figure 7 Different Channels in the conventional Electronic Distribution

The task of managing these multitudes of channels is described in Figure 7. Figure 7 depicts an ideal electronic distribution scenario for a hotel company. Where all the customer touch points namely sales & marketing, partner websites, outsourced reservations centers, travel agent, reception desks, hotel and other websites can have access to the reservations system of the hotel property through various available sources.

Pain Points of Current Electronic Distribution Scenario

Lack of interoperability

Existing travel distribution hinges on capabilities of the GDSs to access information, rate and availability of different types of service providers and different brands. Among the drawbacks of GDSs are their cumbersome nature, inflexible technology (a proprietary format called TPF) and difficulty in interfacing with external systems (of service providers and travel agents). Therefore, customers require the specially trained users in the form of travel agents and service providers require proprietary switch programs.

Difficulty in integration of multiple service providers

GDSs were engineered basically to book airline inventory and they are capable of generating PNR for bookings of individual service provider. Because of the technical limitations GDSs are not capable of treating one itinerary as one travel reservation. In fact, customers through a travel agent would have to make separate bookings for an airline, car rental and the hotel and get three separate PNRs (Passenger Name Records) for one itinerary. This drawback necessitates human intervention in the form of travel agent as a facilitator who can access the GDS system identify service providers, and their rate and availability and make a confirmed booking for the passenger.

Cost of Travel Agencies

Though GDSs provide access to the different types of inventories they are not easy to work with and require intervention of travel agents who are trained to use the GDSs. Traditionally, the costs of the intermediation were borne by the service providers in the form of commissions. Travel agent could cost the service provider like an airline between 6% -15% of their sales through the travel agents. Airlines, particularly the US airlines, under severe cost pressures, have been constantly driving down the rates of commissions payable to the travel agents. In fact, most US airlines now do not pay any commission to the agent for domestic routes in the US. Hotels are no different it costs hotels upto 10% to get business through the travel agents.

To avoid paying high rates of commissions to the travel agents the service providers now offer non-commissionable or net rates to their corporate customers. These customers can book pre-negotiated rates directly with the service provider either through the GDS or internet without involving travel agent. If the corporate client uses the travel agents to facilitate their travel processes they can avail the services at additional costs by paying service charges to the travel agents.

Cost of conventional electronic distribution

Though the GDSs give a wider reach to the service provider it comes at a high price. One of the major pain points of the service providers is the cost of distribution or selling the inventory through the GDS centric channels. For some of the airlines, upto 70% (HRG, 2001) of revenues come via the GDS. Therefore, cost of distribution has a direct ramification on the bottom line of airlines. Forrester report (Harteveldt Henry H., McQuivey James & DeMoulin Gillian [HMD] , December 2002) points out that on an average, it costs \$12 to \$17 to sell a round trip ticket, which is about 6-8% of the fare of coach class. To make the matters worse, even though the airline industry has been going through its worst ever crisis some of the GDSs have in fact increased their fees.

Hotels are no different when it comes to high costs of intermediation. GDSs charge between \$4-\$8 per booking for number of net bookings. Additionally, hotels also have to pay the switch company and the label provider; these charges can range from \$4 to \$15 depending on the volume of the transactions. So in total a hotels pay between \$8-\$23 for GDS distribution which is about 10% -15% of their average room rate. Table 3 gives an idea of a total cost of distribution for a hotel in the current scenario.

Table 3 Cost of Electronic Distribution for Hotels in the US

Average GDS fees	\$6
Average Switch fees	\$3
Average Label Provider fees \$6	\$6
Total cost of intermediation	\$15
Average Daily Rates (ADR) in the US market (2002)	\$84
Cost of intermediation	17%

So the total cost of intermediation could be as high as 17% of the total room revenue received from these channels. As the travel industry grapples with the recession and the non-conducive geo-political environment for travel these high costs have driven the businesses further to the brink and have often prompted the service provider to avoid the GDSs and switches to sell their inventory on to the websites directly to the customers. Marriott chain of hotels recently claimed to have achieved more than \$ 1bn sales through their own website.

Rate Anarchy & challenges in yield management

In the existing distribution scenario, the service providers are forced to sell their inventory on disparate and at times disconnected channels. As seen earlier the existing technology has not been easily & economically available to enable seamless and uniform connectivity to all available channels. This results in service providers having proprietary connections on diverse channels. For example, a hotel chain may have its own CRS, which is not seamlessly interfaced with a label provider. Such proprietary connections result in different sources and channels linked to them showing inconsistent rate and availability information. These inconsistencies make it extremely difficult to optimize the revenue, which in turn could be damaging to the bottom line of the service provider.

The next section looks at web services and how they can impact the travel distribution.

Web Services and their Role in Travel and Hospitality Industry

What are Web Services

Web services are self-contained business applications that operate over the Internet. These applications can be published, located and invoked by other applications over the Internet. They are based on strict standard specifications to work together and with other similar kinds of applications. This adherence to strict standards enables applications in one business to inter-operate easily with other businesses.

The common theme in all their industry definitions is that web services are: They refer to application functions (services) that are loosely coupled, dynamically bound, accessible over the web/intranet, and are standards based and use XML as the lingua franca of communication.

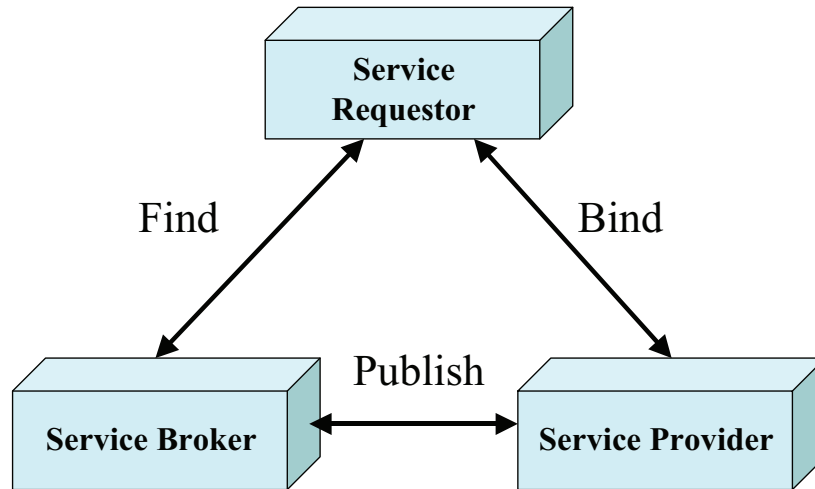


Figure 8 Service Oriented Architecture

Web Services are an implementation of the Services Oriented architecture (SOA) (Figure 8) that has 3 fundamental roles:

- Service provider
- Service requestor
- Service registry

Web services architecture provides a framework for implementing the roles and operations of the service-oriented architecture. It describes principles for creating dynamic, loosely coupled systems based on services and provides standards for connecting, integrating and orchestrating applications.

As the field of Web Services is still very nascent, the standards are still evolving. All the major technology players like IBM, Microsoft, Ariba etc. are involved in defining the standards for the Web Services Architecture requirements. Web Services' USP is the set of standards to which vendors worldwide have adhered enabling seamless interoperability between heterogeneous implementations. The primary standards involved in web services stack which have seen universal acceptance are XML (eXtensible Markup Language) for data representation, SOAP (Simple Object Access Protocol) for messaging, WSDL (Web Services Description Language) for service description, and UDDI (Universal Description, Discovery and Integration) for service discovery/broker.

XML is a markup language for defining structured data. XML documents are written in plain text and contain data structured between user defined tags. XML has enabled different computer systems and databases containing data in incompatible formats to talk to each other by prescribing a simple and common format. Further, XML is a 'metalanguage', i.e., a language for describing other languages, which lets you design your own customized markup languages for different types of documents. This has resulted in development of XML vocabularies by different verticals for representing standard data and process artifacts special to that particular vertical. Languages like FpML, FIXML etc. that cater to specific requirements of an industry vertical are examples. Likewise Open Travel Alliance (OTA), a travel and hospitality consortium has come up with a XML vocabulary for the travel and hospitality vertical.

SOAP (SOAP Specification, 2003) is a XML based lightweight protocol for exchange of information in a decentralized, distributed environment. SOAP, by its dependence upon XML removes the barriers to inter-application communication which was earlier riddled by lack of interoperability between COM, CORBA, and other proprietary mechanisms, and hence reduces the cost of collaboration and integration among applications. WSDL (WSDL Specification, 2003) is an XML based description language for specifying all the details of a business function exposed as a web service independent of the language and platform it is implemented in. UDDI (UDDI specification, 2003) is an industry initiative based on XML which creates platform independent open framework for publishing services, discovering services and integrating services over Internet.

Role of web services and XML standards in the industry

Web services on account of standardized interfaces; provide a smooth way for different service providers to interact with service consumers, leading to easier distribution of services to potential users. It is in this context that web services show promise in offering travel and hospitality services at a reduced cost. The advantages and trends offered by internet, mainly leading to disintermediation and direct connect shall be further strengthened in this domain, owing to the fact that web services represent in application communication, what web represented in information communication.

We envisage the standardization efforts of two kinds to have significant effect on the distribution industry of travel and hospitality. First, the penetration of web services to offer standards based service publishing, interfaces and messaging will help create a uniform infrastructure for the communication between service providers and service consumers. Second, the standardization initiatives around XML by travel industry bodies like OTA and HEDNA, will provide boost to the creation of standard vocabularies for the business processes and artifacts in the industry, enabling automated semantic exchange of messages.

The combination of the two trends, yields a powerful automated electronic way of conducting business electronically in the T & H industry. While web services promise to solve the infrastructure issues of messaging and standardized interfaces for services, the XML vocabularies from OTA and the likes promise to solve the content uniformity problem for payload for these web services. Because the entire industry converges to the standards as dictated in the OTA XML vocabulary, there is no chance of semantic gap between any two interacting entities in the industry be it a travel agent and an airline agency or a hotel and an airline. (Sabre Web Services, 2003) is already leading the way by adopting both web services and the XML specification of OTA in its offering.

The Future Distribution Scenario

We envisage that the travel distribution is likely to gradually change as a result of growing acceptance of web services in the travel distribution. We envisage following changes in the Travel distribution:

- Enhanced Direct Connect and Disintermediation
- Better Integration of GDSs and GDS Clients
- Semantic Web Services (based on OTA spec) leading to Interoperability
- Interoperability leading to enhanced dynamic bundling of travel products
- Emergence of newer forms of value added intermediaries

Enhanced Direct Connect and Disintermediation

Web Services will enhance the options for customers to directly access the travel service providers (direct connect). The options thrown by internet and web based travel solutions for direct connect will be enriched by possibilities of richer experience for customers. Web Services will make possible targeted bundled travel service offerings for consumers involving multiple travel service providers, including airlines, car rentals, hotels, cruise liners, etc.

Internet and Web based systems were good at providing an alternative channel bypassing GDS for selling the inventory of service providers. However, composite travel requirements involving bundling and aggregation of heterogeneous services were difficult on the web. Web Services will make this kind of bundling and aggregation possible. Thus they will enable enhanced and enriched direct connect options for customers including bundled travel service offerings.

Further, such rich direct connect service offerings will eat away into the business pie of the traditional intermediaries including switch companies and label providers. Web Services by providing streamlined application to application communication, will enhance the disintermediation trends initiated by internet as shown in Figure 4. We envision a possibility of elimination of some of these intermediaries including switch and label companies in the long run.

Integration of GDSs and GDS clients

Owing to advancements in the web services, in the short run we believe GDSs will increasingly embrace web services in order to enable service providers to link their CRSs directly with GDSs, and to enable a wider range of clients to access their services programmatically. For the service providers, this will lead to seamless connectivity with the GDSs eliminating intermediaries like label providers and switch companies.

As the costs of intermediaries (switch and label providers) is reduced the service provider would continue to sell through the GDS system allowing the GDS companies to continue to work on their existing revenue model of charging transaction fees per booking made. Also this would allow the GDS companies to continue to leverage their existing investment in the legacy technology.

At the same time we believe GDS companies will engage the offline travel agents in the web services initiative by offering direct access of their web services to the travel agencies. This would enable travel agents, to have custom software with GDS service plugs. This in turn would enable the travel agents to

- Access most updated service provider information, rates and availability through web and interface their systems with the GDS
- Book the inventory using travel agencies proprietary software and to automate end-to-end work flows resulting in efficiency enhancement and cost effectiveness.
- Seamlessly bundle complementary service providers and create consolidated PNRs for their customers
- Provide better value for money to the customers in the form of providing a complete trip experience at reduced service charges,

In the short term we believe that the GDS companies will continue to stay at the heart of the travel distribution but allowing better integration between GDS and travel agents.

Semantic Web Services leading to Interoperability

The biggest concern in adoption of web services for travel and hospitality industry is the achievement of semantic interoperability. Agreed that web services provide the infrastructure for interoperating services from heterogeneous sources, but the biggest source of interoperability problems arise from semantic differences between any two communicating entities. There is a need to define a commonly understood vocabulary between the two entities to achieve a meaningful interaction between any two agents.

Such initiative is being spearheaded by OTA to arrive at the single universal language based on XML and understood by all the entities in the travel industry, including airlines, service providers, agents and GDS companies. OTA has come up with its recommendation recently. (Sabre Web Services, 2003) illustrates the adoption of OTA spec in web services.

As the usage of standardized semantic web services becomes more widespread, it will allow the service providers to access the real time rate and availability of each other without the traditional intermediaries like GDSs. This will lead the industry to forming stronger alliances across the industry segments including all types of service providers like hotels, car rental companies and airlines.

Interoperability leading to enhanced dynamic bundling of travel products

We envisage that service providers themselves would be able to carry out the traditional role of travel agencies by offering bundling options to its customers. Service providers can not only directly sell their inventory to the customer but will also seamlessly cross-sell inventory of their alliance partner. E.g. when fully operational, with the use of web services an airline can dynamically put together a package offer inclusive of accommodation, ground transportation and other services such as travel insurance, foreign exchange, local information on weather, tours among others for its passengers based on the preferences expressed by the passenger.

The service providers can immensely benefit by offering a one-stop-shop facility to its potential buyers without involving the traditional intermediaries like the commission agents and the GDS. In that sense this would be like code sharing but between non airlines, which would be made possible due seamless bundling possibilities that web services is capable of providing. Such kind of trip experience involves multiple travel service providers and requires uniform integration between the multiple service providers. This kind of integration of services earlier offered in silos has been facilitated on account of web services.

Steps are already being taken by erstwhile GDSs, airline companies, travel agencies and online agencies alike to use web services for this kind of integrated services. GDSs (Sabre Web Services,2003; Galileo Web Services, 2002) are looking at unbundling of their legacy data to be able to create smaller fine grained services enabling such kind of integration possible.

Emergence of newer type of value added intermediaries

As the web services become common in the travel distribution it reduces the importance of the traditional intermediaries like the travel agents. As service providers, themselves, can offer services provided traditionally by the travel agents of bundling the different components of the itinerary direct connect with partner and non partner service provider travel agents would face increasing competition even in the complex itineraries.

Similarly the GDS companies would face competition from non-conventional players in travel distribution such as local / national / regional tourism boards of particular geographical area which can act as a registry or service brokers of all the service providers in the area they represent. Service requestors (agents or customers directly) can learn about the service providers through such registries and create their itinerary which is directly booked with the service providers selected. Some other non-conventional players which can act as a registry or service broker, are mega internet service providers (ISPs) such as MSN, America Online etc, travel sites like Opodo, Orbitz and hotel.com, and consortiums of service providers from same travel industry segments. Figure 9 depicts the future distribution scenario in travel industry. An example of a local tourism body leveraging web services can be found in (AAA uses web services, 2002).

Electronic Distribution with Webservices & Industry standards

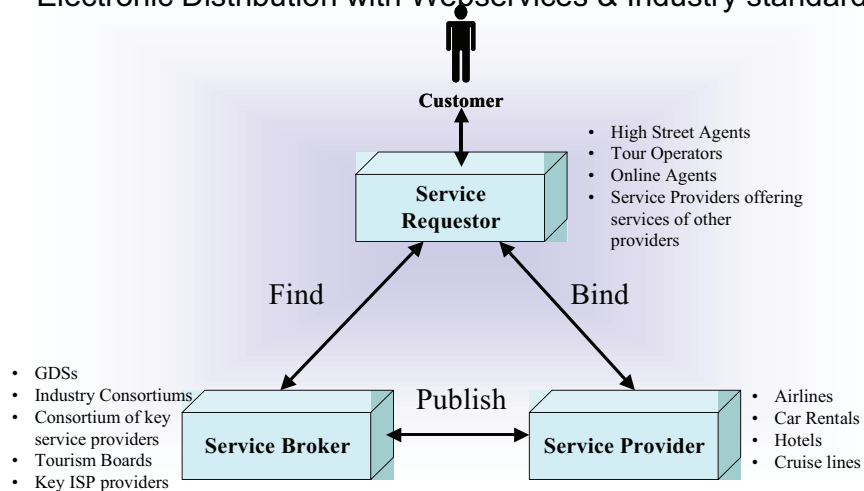


Figure 9: Electronic Distribution with Web Services and Industry Standards

How Web Services will change the role of existing Players

Service providers

The increased role of web in facilitating newer channels for travel related service providers is further strengthened by web services. Overall, the service providers will be facilitated by web services to offer consolidated services from heterogeneous components (air, auto rental, hotel booking etc) into a single uniform service. Overall the effect of web services on service providers can be explained in the following points:

- Web Services will facilitate cross-selling or bundling of services between different stakeholders in travel like airlines, hotels, rental agencies, travel information providers etc thereby facilitating a “trip” concept.
- Web Services will facilitate sharing of customer loyalty points across multiple services possible. e.g. Customers can use the miles gathered from a frequent flier plan of an airline to get a car rental free.
- Distribution Costs on part of service providers will be considerably lowered because of increased non-GDS outlets including direct to customer being facilitated by the availability of web services.
- Enrich the access options for customers beyond travel web sites to include mobile clients, PDAs etc. (SAS Case Study, 2003) is an example.
- Web Services will extend the life of legacy systems based CRSs. This in turn gives a significant ROI to the service providers because of the lowered TCO. (TRX Web Services, 2003) is an example of such a case study.

- Service providers will start standardized web services offerings around XML interfaces based on OTA spec. This will be a key enabler of easing the integration of multiple players in the industry to offer combined services in a seamless manner.
- Web Services can offer insightful 360 degree view of the customer by offering better and streamlined business intelligence capabilities facilitated via web services.
- Removal of rate anarchy in different channels

Other intermediaries

In contrast to GDSs, other intermediaries in travel like the switch companies etc. face real struggle for survival in face of availability of direct connect owing to web services. In view of this it is possible that there is quite a lot of pressure of cost on these providers, and many of these companies face elimination owing to the disintermediation trend attributed to web services. Some of the services may however, survive by providing value added support in the form of outsourced processes by the service providers such as commission handling services among others.

GDS companies

The archaic systems of GDS have been the primary source of all data related to travel reservations. In view of the cost pressures upon GDSs they need to reinvent themselves or face loss of customers. The trend of disintermediation initiated by internet will increase owing to web services because of the supplier direct initiatives to customers being facilitated by the web services. The effect of web services on GDSs can be summarized as below:

- The increased direct availability of travel services by web services increases the pressure on GDS to revamp their business model which relied earlier purely on transaction fees from airlines and travel agents. Newer business models need to be evolved to enhance the conversion of GDS data into newer revenue channels.
- The mode of communication between GDSs and agents using GDS was based on traditional legacy TPF format. This is a major hindrance in scaling up to newer models of travel related services which require more agile data formats like XML. Galileo and Sabre (Galileo Web Services, 2002; Sabre Web Services, 2003) have already shown steps in this direction.
- GDSs need to wrap their reservation data by appropriate service oriented architecture whereby service requestors can make service requests using web services, and the availability of travel services from GDSs reach wider and newer channels than erstwhile agents who relied on dedicated terminals of GDS. This kind of availability of services will yield newer categories of agents who can act as channel distributors of GDS services.
- GDSs must supplement XML based services by conforming to travel industry standard XML vocabularies like OTA spec. This allows easier integration of GDS based services with other services from travel providers. Sabre (Sabre Web Services, 2003) is an early adopter.

Travel agents

The conventional travel agents usually depended upon the GDS terminals to provide the reservation services and were quite limited in their capacity to fine tune a trip. A trip would constitute multiple services bundled together. But each service would need disconnected reservations. Web Services will enable travel agents to access both the services from airlines /service providers directly as well as web services from GDSs themselves and will in turn be able to offer better service and newer types of services. Some of the effects of web services on travel agents can be summarized as follows:

- They will be able to offer integrated trip service to customers revolving around multiple service providers including airlines, cruise ships, car rentals, hotel bookings etc.
- The increased role of internet and web services will further the already evident trend of loss of commissions for travel agents.
- Web Services will reduce the dependency of travel agents upon GDS for sourcing due to the availability of direct travel services from service providers. However bigger travel agents will still hold on to GDS for the reason of traditional partnerships, to maintain business continuity. Details of a case of direct connect adoption can be found at (Carlson Wagonlit Direct Connect, 2003).

- New generation of travel agents able to assimilate heterogeneous services to a trip experience will gain foothold. Novel online travel agencies will see a surge which will be able to offer innovative pricing models like Priceline.com etc.
- In addition, having direct access to raw travel data means that travel agents are empowered to dynamically target useful and relevant information at appropriate points in the booking process. Increasing the appeal of the destination in this way also increases opportunities for cross-selling and up-selling.

Customer

Overall, web services promises to enhance customer experience in the travel and hospitality industry and offer him/her more for less. The main advantages of web services for the customer can be summarized as below:

- Consolidated trip experiences.
- Possible reduction in overall costs of travel
- Customer self-service will facilitate customers to plan and book trips on their own without any agents etc. Already tele-check-in is common in many parts of the world.
- Alerts based on specialized configurations will be available. E.g. it is possible to change the itinerary of a customer if there is a change in the airline schedule triggering an alarm to the customer on his/her mobile/PDA.
- Single Customer View leading to a better picture presented to customers.
- Innovative travel models leading to better customer experience for the travelers
- Loyalty sharing possible across multiple service providers.
- Dynamic reconfiguring of itinerary possible due to web services. If a busy traveler wishes to change his schedule on the fly it should be possible.

What's required to happen before Web Services and XML Standards is widely accepted by the Industry

Initiatives by OTA

OTA is a self-funded, non-profit organization, OTA is comprised of major airlines, hoteliers, car rental companies, GDSs, technology providers and other interested parties working to create and implement industry-wide, open e-business specifications. On its part, OTA has published standardized XML specs as of date for various components of travel and hospitality industry. Further, it has adopted ebXML messaging (ebXML Messaging Specification [eMS], 2003) standards for the messaging and security requirements to cater to the vocabulary based on its spec.

But in addition to publishing of the standard spec, OTA needs massive evangelization moves for endorsing OTA spec among all the players in the industry including offering guidance to smaller and medium players to a proper road-map for adoption of the standards.

Web Services Security Standards Convergence and Maturity

Notwithstanding the lack of convergent standards in web services, there is a significant awareness in the vendor community to address the security issue. As of date, diverse standards have been proposed to address the special requirements of web services security. Conventional web security standard of SSL has been shown to be inadequate in handling web services security standards. W3C on its part has published the basic standards of XML Encryption and XML Signature both of which have received wide acceptance by the industry. The next level of security specs for web services including WS-Security, SAML, and XACML are currently in the process of standardization at OASIS. Also, WS-I organization is working on development of interoperability specs around these standards. These developments are positive trends indicating seriousness on part of vendors in addressing all the issues in web services security including convergence and interoperability of standards. This is a significant driver for web services adoption.

Developed parallel to the web services security standards, the specification of ebXML messaging (eMS, 2003) is more mature and has an inbuilt security mechanism based over PKI, to address the issues of non-repudiation in addition to encryption, authentication and authorization issues. Since the non-repudiation issues are critical to any transaction, ebXML messaging offers a more robust infrastructure in terms of security over SOAP 1.1 and has hence been chosen for the OTA implementation.

Other obstacles in the road to future

The primary obstacles in the road to adoption of web services by the travel and hospitality industry are part technological and part political.

The technological barriers have been discussed earlier in this section, primary among them being the flux in the security standards for web services. Once there is stability and convergence in these standards, there is wide scope for applicability of web services in the sector, and leading to greater and more agile businesses in this sector. Given that already HTTPS (Secure HTTP) has occupied the mindshare of the general public for e-commerce, it should not be too difficult to leverage the same for the web services security standards to be established firmly in minds of customers.

The other categories of obstacles fall mainly under the political category. Existing bigger players feel a threat to their business models, mainly the GDS players which derive a considerable income on the data services they offer to the different travel agents and other service providers. In order for the standardization initiatives by OTA and web services to succeed in this industry it is necessary for the bigger as well as the smaller players to work towards convergence of the OTA spec covering as many diverse services as possible. Further, the availability of open services should not be seen as a challenge to their business, instead should be viewed upon as scope for new services and newer business models.

Road Map to Embracing Web Services

The practical road map to embracing web services should keep in view the abovementioned inadequacies and/or limitations in web services standards. Based on this it is necessary for service providers and GDSs to embark upon a roadmap making full potential of the service oriented architecture as made feasible by web services.

For Service Providers

The staged approach by service providers can be outlined as below:

- Do a portfolio analysis of the current service offerings offered to GDS systems.
- Examine which of the current applications can be exposed direct to customers by a careful cost analysis of GDS costs and cost savings due to direct selling.
- Before embarking on application oriented web services, offer non-transactional services like airline ticket availability checking (information oriented) directly over web on a portal.
- Out of the transactional services, enable core services like CRS functions as web services exposed over HTTPS to select channel partners, existing partners, customers and other new partners.
- Look at usage of web services for diversifying the access options for customers beyond travel web sites to include mobile clients, PDAs etc. (SAS Case Study, 2003) is a case in action
- Look at the web services portfolio of the GDS systems, and create service offerings around these web services and evolve newer cost and profit sharing models with GDSs as conventional models may not work.
- Try evolving new and complex service offerings by mix-n-match of web services from other service providers, channel partners and/or GDSs.
- Offer dynamic travel alerts mechanisms to attract customers.
- Create awareness among consumers, either direct or through travel agents to the new service portfolio including portal for reservations etc.
- In the long run, once standards for web services security and transaction get stabilized, move over the architecture from HTTPS to these standards.

For GDSs

The staged approach by GDSs can be outlined as below:

- Re-Architect the entire GDS systems to a loosely coupled one based on services, by leveraging the legacy systems and legacy databases to keep the ROI intact. It is essential that the existing systems offering specialized functionalities for reservations, need to be exposed as web services to enable better re-use. This requires re-architecting of the systems of GDSs.
- Evolve newer cost models for sharing of services with partners based on new services oriented model. This involves re-think alongside individual service consumers of GDSs.
- Look for adoption of standards from OTA to improve interoperability
- Prepare appropriate transition plan for migration from older architecture to the newer agile service architecture, especially involving re-configuration of the millions of terminals of GDS distributed globally which converse with GDS using TPF.
- Look at newer business models by content and services partnerships with newer service providers like AAA, car rentals etc.

Conclusions

The usage of internet has significantly enhanced the role of electronic means in distribution of travel inventory. Online players taking part in electronic distribution include travel sites, GDSs, online travel agents etc. In spite of the significant role of internet in offering streamlined front-end for travel reservations, the problems of interoperability, high costs and enhanced role of centralized GDSs still plague the electronic distribution process of travel inventory. We have shown how Web Services, a recent technological trend in distributed computing, can help in resolving the interoperability issues. In this treatise, we have examined in detail the role web services can play in streamlining electronic distribution of travel inventory.

Further, we present the futuristic scenario of electronic distribution in travel, highlighting the changes web services can bring about including trends like disintermediation. We conjecture that web services will further the disintermediation trends initiated by internet in the electronic distribution. We also presented how different players in the game will be affected by the induction of web services.

To summarize, we visualize the following changes to happen in future:

- **Disintermediation:** - Switch companies and Label providers may be eliminated from the distribution of hotel and car rental electronic distribution scenario. We also believe that increasingly, direct connect between the service providers and travel agencies would limit the existing role of GDSs as a key intermediary. Web Services will enhance the trend of disintermediation in the industry initiated by the internet.
- **Standardized Content:-** The initiative of a common XML based industry wide vocabulary from OTA will be a catalyst for guaranteeing semantic interoperability for web services thereby ensuring streamlined communication between heterogeneous players.
- **Changes in the roles of GDS:** - We believe GDSs will transform themselves and embrace web services to be able to offer streamlined connections to travel agencies and service providers to its services at lower costs. This will encourage even the smaller players to offer their inventories through the GDSs and encourage travel agents to offer more value added packages.
- **Value Added Service providers Value Added Service providers with stronger cross industry alliances:** - Service providers like airlines, hotels and car rentals as well as online travel agencies will seamlessly be able to offer bundled services to the customers which spur new sets of cross industry alliances among the service providers.
- **Emergence of newer players, like consortiums of regional players and regional tourism boards:** - In the long term, consortiums of smaller service providers and regional players would emerge to act as cost effective service registries/ aggregators to further reduce the role of GDS in their distribution.

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