The use of e-freight has the potential to save the air cargo industry billions of dollars per year. Removing paper from the air cargo supply chain process is easier said than done, however. This article analyses the e-freight concept, its potential benefits, and issues with e-freight implementation.

The savings generated from utilising e-freight

Using technology to increase efficiency by eliminating paper and improving the ease of electronic communications can cut costs and increase revenues. E-freight is an initiative to help the air cargo industry reap benefits, including: the elimination of paper and associated processing costs; faster supply chain transit times; higher degrees of regulatory compliance; and better tracking of shipments.

The air cargo industry, however, has been relying on paper-based processes for many years. Given the number of parties involved in any one shipment, there are several limitations and problems associated with implementation of e-freight, which will take significant time and investment. This article examines the current system for processing conventional freight, how the e-freight process will work, the potential benefits and savings generated from utilising e-freight, and its limitations and problems.

Current process

Shipping cargo traditionally involves several paper documents at different stages of the process. This includes both mandatory documents, required by the relevant authorities, and other documents used by shippers, freight forwarders and airlines. Customs documents differ from country to country, and also depend on the nature of the cargo being shipped. Some types of cargo, such as live animals, for example, require more customs documents than others. Air cargo documentation is therefore particularly complex, and varies according to the origin and destination (O&D), the customs requirements at any stop-over countries, and the type of cargo carried.

The typical air cargo supply chain is broken down into several stages. Bernd Appel, senior vice president, Industry Solutions at Lufthansa Systems explains: "The initial step is for a freight forwarder to make a booking via fax or telephone. The booking is then captured into an air waybill (AWB), which is printed by the agent." An AWB is a non-negotiable transport document, and is evidence of the contract of carriage of the cargo, and as evidence of the receipt of goods.

"Next, the freight forwarder delivers the shipment and the AWB to the airline office. The airline representative will stamp the AWB and capture the data into its IT system," continues Appel. "The information about this shipment is then added to the flight manifest, which the airline officer prints and delivers to the aircraft while the cargo is being loaded."

The freight forwarder will also have to pass the cargo through export customs. Export goods declaration documents are required at this stage, along with any other customs documents for the country of departure. AWBs are also checked. The cargo for each flight can then be moved onto the aircraft itself, according to the flight manifest document.

There are other documents involved in this process, however. "Along with house and master AWBs and customs documents, other documents include: a purchase order/contract of sale; commercial invoice/proforma invoice; insurance certificate; certificate of cargo origin; and a bill of lading/flight manifest," says Wolfgang Meier, retired manager of business intelligence, cargo IT systems at Lufthansa Cargo. "Also, looking at the financial side of trade, a letter of credit will usually be exchanged using two banks."

Steve Hill, principal industry consultant, eCargo at CHAMP Cargosystems, explains this further: "Shippers prepare and supply invoices, packing lists and certificates; freight forwarders prepare house waybills, master waybills, consolidation manifests, and some customs documents; carriers prepare flight manifests, some cargo declarations, cargo receipts, and delivery notes; and import brokers/agents prepare goods declarations."

Once at its destination, the cargo is handed to the arrival ground handling agent, with the relevant documentation. Documents required here are import goods and cargo declarations to allow the shipment to clear through import customs at the destination country. The cargo is then delivered to the consignee via the destination freight forwarder.

The sheer amount of paper involved, therefore, complicates the air cargo supply chain process. "About 8-12 copies of an AWB are printed for any one cargo shipment," says Mukundh Parthasarathy, solutions manager, Sabre Airvision Cargo at Sabre Airline Solutions. "There is at least one copy for the origin freight forwarder; (at least) one for the airline's records; (at least) one is directly attached to the cargo; one for the customs officials; one for the destination freight forwarder; and (at least) one for the consignee." Sometimes multiple copies are printed for the people involved in this process,

Research by IATA shows that an air waybill can be printed or entered into systems up to 24 times. This is because up to 24 different parties have to deal with processing them.

depending on their individual requirements or what information archiving systems they have in place. This can also be the case for many of the other documents required in the cargo transportation process. This means that the total amount of paper required for any one shipment builds up quickly.

The amount of AWBs required on any particular air cargo shipment could be even higher than this. "A central finding of the very old (1974) International Air Transport Association (IATA) Cargo Automation Research Report was the fact that the AWB had been printed or entered up to 24 times into systems.That is, up to 24 different parties had to deal with the processing of AWBs," says Meier. "The number of parties involved may have increased even if the manual entry of AWBs and other documents has been replaced by electronic data exchange." Although technology has moved forward a great deal since 1974, air cargo paper documentation has not."

The responsibility for ensuring accuracy with these paper documents is also complex. Customs documents, differing in requirements by the laws of individual countries, often carry the highest penalties for inaccurate or incomplete forms. "The airline carrier has the final responsibility for accuracy of the required customs documents," says Parthasarathy. "Fines can be as high as $10,000 for carrying cargo without the correct customs documentation. The airline, therefore, must be able to check and send customs information before transporting the cargo."

Paper documents must be manually checked, which means that human error is a factor. "As many as 8-10 people are involved in processing the paper documents for any one shipment," says Parthasarathy.

Added to this is the fact that some cargo is much more complicated to transport than other types. "Some countries, such as Brazil, have highly regulated customs requirements, making the documentation process highly complex," says Parthasarathy.

The airlines put the onus, therefore, on both the freight forwarders and shippers to ensure correct customs documentation. This is because of the aforementioned fines that an airline will incur for transporting cargo without the proper customs documents. If the airline finds that customs documents are incomplete or incorrect, it will pass cargo back to the freight forwarder, which in turn will pass it back to the shipper if the problem is not easily resolved. In reality, due to the amount of paper and manual checks required, mistakes do occur and, if they are not found in time, the airline suffers financially.

E-freight concept

E-freight aims to eliminate the paper from the air cargo supply chain process.

As defined by IATA, e-freight is an initiative for the air cargo supply chain, by the air cargo supply chain. It involves carriers, freight forwarders, ground handlers, shippers, customs brokers and customs authorities. It replaces paper documents with electronic messages; with the aim of reducing costs, improving transit times, accuracy and the competitiveness of air freight.

"E-freight is intended to eliminate paper documents, including AWBs and customs declarations," says Parthasarathy. "Paper will only be used when absolutely necessary, and will be replaced through the use of e-bookings and e-messages. This includes the use of 'smart' technology including smartphones and iPads."

IATA says that e-freight involves 20 paper documents, which will be cut by 64% if 100% implementation of e-freight is achieved. Of these 20 documents, 12 are listed as mandatory and eight as optional. The 12 mandatory documents are: invoice; packing list; master AWB; house waybill; house manifest; export goods declarations; customs release export; flight manifest; export cargo declaration; import cargo declaration; import goods declaration; and customs release import.

The eight optional documents are: certificate of origin; letter of instruction; dangerous good declaration; CITES (Convention on International Trade in Endangered Species of wild fauna and flora) certificate; transfer manifest; transit declaration; security declaration; and freight book list.

For the e-freight initiative to be

successful, shippers, freight forwarders and airlines must first agree to use e-freight procedures in their transactions. "A prerequisite for e-freight is a bilateral agreement between carriers and forwarders," says Meier. "This means each individual carrier and forwarder must have agreements in place for the e-freight initiative to work."

Second, shippers, freight forwarders and airlines must have e-freight-capable IT systems in place to facilitate the new system. Since e-freight is about cutting paper in favour of electronic documents and messaging, the relevant IT systems must communicate with each other. "The right IT systems and interfaces must be in place to make e-freight work," says Parthasarathy. The labour force of the shippers, freight forwarders and airlines must also be trained on new procedures of using e-freight.

Once this is in place, national governments must also agree to the use of e-freight for imports and exports. Since legal customs documents are within the scope of the e-freight initiative, governments must agree to use electronic customs documents to import or export freight using e-freight processes. These governments must also have the relevant IT systems in place to process e-freight documents legally and accurately.

Another important issue to note at this stage is that e-freight will not be applicable to all types of cargo. "Paper documents will still be required for certain kinds of shipments. Perishable and dangerous goods, for example, are not in the scope of e-freight," says Meier. "There is a widely known 80/20 rule in air cargo. This is that 80% of the freight takes 20% of the time to process, while the remaining 20% of the freight takes 80% of the time. E-freight will cover most of the 'normal' 80% of freight, while the more complicated 20% will be less covered by e-freight." Meier adds. "E-freight should help improve this ratio, however."

Benefits and savings

Once implemented, e-freight offers several benefits to its users. According to IATA, significantly lower costs to the air cargo industry as a whole will be possible. It says average annual savings will range from $3.1 to $4.9 billion, depending on the level of e-freight adoption.

These savings will be achieved in a variety of ways. "As the process is electronic, an airline can generate savings in the archiving process, as well as in handling because there are fewer mistakes

in writing and so fewer irregularities," says Appel. This means that because less paper is involved in the supply chain process, with electronic processes in place, there is less scope for human error. This will lead to fewer mistakes being made in the transport of cargo, and less mistakes on the required customs documents. This will reduce fines and thus reduce costs.

"E-freight will lead to fewer customs fines, because the systems will prompt users to ensure the correct e-documentation has been submitted and approved for each shipment," says Parthasarathy. "Cargo will only be cleared to go once the system shows e-documentation is correct, thereby improving accuracy levels and leading to fewer customs document errors.

"These savings can be even larger, dependent on the type of cargo carried," continues Parthasarathy. "Customs fines vary by commodity, so if valuable goods have incorrect customs documentation, the fines imposed are higher than for lower value goods. E-freight will help to minimise the errors that cause these fines."

This is echoed by Appel, who states: "Quality of documentation is improved, and therefore cost savings are increased, for goods with special conditions such as perishables, since the correct handling is clearly defined."

Greater accuracy is also listed as a benefit of e-freight from IATA. As well as reducing the risk of customs fines, greater accuracy in documentation reduces the time delays to shipments, increasing the on-time delivery performance of the air cargo industry as a whole. "With e-freight, the exchange of electronic data leads to less manual data input for all parties concerned, which in turn means time savings and reduced mistakes," says Appel.

Another benefit that IATA lists is faster supply chain transit times. As air cargo shipment documentation can be sent more quickly, and ahead of the cargo itself, IATA says end-to-end transport cycle time can be reduced by an average of 24 hours. IATA also says that electronic documents are less likely to be misplaced, so shipments will no longer be delayed because of missing documentation.

Further cost savings can be achieved by reducing the use of paper. Less paper will be bought, less ink will be used to print the many documents used in the air cargo supply chain process, and fewer printers will need to be used and maintained. On a per shipment basis, the paper and printing savings may not be that high, but when all shipments are added together, this is a significant saving. IATA estimates that more than 7,800 tonnes of paper documents can be eliminated through the use of e-freight - equivalent to 80 747 freighters. This shows the significance of the paper and printing costs that e-freight can save the air cargo industry. Reducing paper and printing costs will also help to conserve the environment and reduce the industry's carbon footprint.

E-freight can further reduce costs to the air cargo supply chain process by eliminating some of the labour required, as well as increasing productivity of the labour force. "Using paper documents, 8-10 people are required to process the paperwork for any one shipment," says Parthasarathy. "This can be reduced to 2-3 people through the use of e-freight." This is a significant reduction in salary costs to the parties involved.

Labour productivity can be increased as well, because less time will now have to be spent physically filling out paperwork. E-freight will do a lot of this work automatically, reducing the amount of human interaction with the documentation. This reduces human error, and allows these employees more time to carry out other tasks. This will increase manpower productivity.

Improvements in freight capacity forecasting can also be made through the use of e-freight. This is because the more data that is archived electronically, the greater the accuracy and reliability of the historical data that is used for forecasting. This will allow carriers to better optimise their schedules to match demand for freight capacity. "E-freight will and does improve capacity forecasting," says Hill. "As data quality is key for successful capacity forecasting, e-freight delivers a higher quality input data.

"E-freight can also improve/quicken the process of allocating freight capacity once demand forecasts have been made," continues Hill. "As e-freight brings a

higher reliability to the data, more efficient allocations of capacity are made, so more revenue can be realised by the carrier. CHAMP assumes that this process can increase revenues by 3-5%."

Implementation problems

Eliminating paper from the air cargo supply chain process will not be easy or straightforward. Due to the complexity of the supply chain and the global nature of the industry, there are a number of limitations and problems. "Like many advances in technology in the aviation industry, use of e-freight will take a significant length of time to become the norm," says Parthasarathy. "It will be 5-7 years before e-freight is widely implemented."

The first problem is the requirement for agreements on e-freight between freight forwarders and carriers. If both parties do not agree to e-freight principles, then e-freight will not be adopted, and paper documents will continue to be used. If the two parties do agree on e-freight, however, then both need to have the correct IT systems in place for them to electronically communicate with each other. Updating to new IT systems for the e-freight process can be costly for those companies that have always used paper documentation. It also takes time to implement these new systems and until these are widely in place, the e-freight initiative will not be a success.

If the correct systems and e-freight agreements are in place, a further

complication arises when a third party is introduced. "Agreements in airline alliances complicate things," says Meier. "A forwarder, for example, may have an agreement on the e-freight process with Lufthansa. To fulfil the delivery, however, Lufthansa may want to transfer the cargo to their alliance partner, Singapore Airlines, at an intermediate hub. If the freight forwarder does not have an e-freight agreement with the third-party airline, then the whole shipment reverts back to paper processes."

Using multiple airlines to transport cargo is common, so a large web of e-freight connections needs to be in place for the e-freight initiative to be widely used. This is another reason why worldwide implementation will take a long time. E-freight can only be implemented as fast as the slowest parties to have put both e-freight-capable systems and e-freight agreements in place.

A further complication is government and legal requirements. As each country has its own individual customs documents and requirements, the customs departments of each country must also be willing to implement the e-freight initiative. This means that their customs IT systems must also be e-freight capable and compliant.

"The IT infrastructure is vitally important to e-freight implementation," says Meier. "In developed countries, where this infrastructure is already in place, e-freight implementation will be much easier. It will be more difficult in less developed countries." It is expected, therefore, that e-freight implementation

It is expected that it will be 5-7 years at least before e-freight is completely implemented. The first problem to overcome is to get all carriers and freight forwarders to agree to e-freight principles. Even when this is agreed, both parties need to have all the correct IT systems and hardware in place that communicate with each other. These IT systems will also have to be updated periodically. A large web of e-freight communications will be required where freight shipments are transported by several carriers.

taken into account. If a shipment is damaged, for example, the e-freight procedures need to show exactly who is liable. Without physical signatures, e-messages must still show proof of receipt and who is responsible for the cargo at each stage of the supply chain. Paper may still be required in these situations to resolve the issue."

Summary

According to IATA, by the end of 2011, e-freight was in use in 42 locations worldwide, and incorporated at 430 airports. IATA says this represents over 80% of international tonnage. The IATA vision is to have 100% e-freight in place by 2015. Whether this is realistic or not remains to be seen.

"E-freight is a stepping stone towards a more streamlined and efficient air cargo supply chain process," says Meier. "It is helping to strengthen relationships within the air cargo community, identify weaknesses in processes, and to further harmonise procedures. Errors will be made, but this is how processes will be improved for the future, and is typical in the development of any new system."

The benefits of e-freight implementation are felt by all parties in the air cargo supply chain process, and it is therefore in the interest of all parties to implement this initiative as soon as they can. The airlines, forwarders, and governments must work together, however, for e-freight to become effective. As Appel says, "e-freight only works if the processes of the three main parties are harmonised."

This harmonisation faces many challenges, including deeply embedded paper-based processes, antiquated IT systems, and government red tape. This is slowly being overcome, but it will take time before 100% e-freight can be seen. 2015 may be a realistic goal for all air cargo between developed countries, but it may take longer for cargo involving less developed countries. **AC**

will be more widely seen for air cargo between developed countries at first, before less developed countries can catch up."

Appel agrees: "E-freight relies on electronic data exchange between IT systems, so it will always fall short in countries or regions where the use of electronic data interchange (EDI) enabled IT systems is not the norm."

Even if certain countries have e-freight enabled systems, they still may require certain documents to be hard copies as part of their customs requirements. "E-freight implementation is limited to the customs requirements of each individual country. No airline, freight forwarder or IATA can dictate terms to a country on its customs requirements," says Parthasarathy. "Some countries will always require paper. One of the main challenges of e-freight is the number of countries involved in the air cargo industry, all with different rules and regulations."

A key component of e-freight implementation, therefore, is the necessity for all parties to have e-freight enabled systems in place. If certain parties in the supply chain are yet to embrace this change or are slow at implementing it, there are ways of incentivising the move towards e-freight. If a freight forwarder is not yet e-freight enabled, for example, a carrier can incentivise it to change its systems by offering discounts for cargo shipped with e-freight processes. "Airlines can incentivise both forwarders and even countries to change their

systems to e-freight through the use of discounts," says Parthasarathy. "This can only be effective, however, when airlines have major market share with those forwarders, and in those countries. IATA, as a middle man, can also lobby those parties to change their systems to e-freight."

Air cargo IT systems providers are playing a role in enabling airlines, forwarders and governments to become e-freight enabled. An example is the CargoXML product by CHAMP Cargosystems. "CargoXML is driving a new era for air cargo IT. CHAMP is working collaboratively with the industry to bring eCargo to life," says Hill. "From a customs perspective, one of the biggest benefits of the CHAMP service is that it acts as a single interface to various customs organisations, thereby saving significant amounts of time and money. The CHAMP community of customers is able to deal directly with customs officials in the local language, helping to overcome barriers of time, geography and culture."

Using systems like this will enable the various stakeholders in the air cargo supply chain process to speed up the process of enabling e-freight. It is only after this that the benefits of e-freight will be seen.

Despite this, getting rid of the paper from the air cargo supply chain process will not be easy. "The transition from old procedures to the new procedures will be challenging," says Meier. "There are also some extra legal issues which have to be