LSE

SKY HIGH ECONOMICS

Chapter One: Quantifying the commercial opportunities of passenger connectivity for the global airline industry

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in association with

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aviation

Contents

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Foreword

Welcome to the first instalment of the 'Sky High Economics' study.
This study, conducted by the London School of Economics and Political Science, is the first of its kind to comprehensively model the socio-economic impact of the connectivity revolution on the aviation industry. This will include a later report looking at the potential benefits that connectivity will bring to Operations & Safety and the impact of passenger connectivity on Loyalty & Behaviour within the aviation industry.

This first report looks at the Revenue and Economics of inflight passenger connectivity. The findings point to a future in which airlines will require a high quality, global solution to capitalise on the potential revenue opportunities that exist within the market; the seismic shift to an 'always connected' culture means passenger Wi-Fi is now a necessity rather than a luxury. With this connected network of passengers comes a sizeable revenue opportunity with the power to entirely re-shape the aviation industry.

I am proud to say that Inmarsat Aviation is uniquely positioned as a partner to help meet the growing demands for high quality aviation connectivity, with its wholly owned and operated global satellite networks.

The skies represent the final frontier in the race to connect travellers to high quality broadband connectivity, and this research clearly demonstrates the magnitude of the opportunity at stake.

Bring It On!

Executive Summary

The global airline industry is on the cusp of a connectivity revolution. Currently 3.8 billion passengers fly annually, with only around 25% of planes in the air offering them some form of onboard broadband. This is often of variable quality, with patchy coverage, slow speeds and low data limits. By 2035, it is likely that inflight connectivity will be ubiquitous across the world.

Non-broadband-enabled 'traditional' sources such as seat upgrades, onboard duty free and baggage fees are currently worth around $60 billion to airlines. For the first time, this research study bridges the gap between current market estimates of traditional revenues and the forecasting of incremental revenue from broadband-enabled cabins. Using IATA passenger traffic data and forecasts of growth, including a near doubling of passenger numbers to 7.2 billion annually, this research study forecasts that broadband-enabled ancillary revenue will reach an estimated $30 billion for airlines by 2035. Overall, a total market of $130 billion of additional revenues will be created. As well as airlines, this market will include content providers, retail goods suppliers, hotel and car suppliers, airlines and advertisers.

The four primary areas of broadband enabled ancillary revenue have been defined in the research are:

• Broadband access

• Advertising, encompassing interruptive advertising and pay-per-click

• E-commerce and destination shopping

• Streaming, including premium content

The research looks at six key regions: Asia Pacific, Europe, North America, Africa, Middle East and Latin America, analysed using both primary and secondary research, drawing on available data of passenger numbers and of forecasted aircraft growth globally.

By 2035, broadband-access revenue is forecast to remain the highest single source of new ancillary revenues, accounting for 53% of the total market, followed by e-commerce and destination shopping at 40% of the market, with advertising revenue accounting for 8% of the market, and premium content at around 2.5% of the market. Per passenger, this means an increase of 1,129% in broadband enabled ancillary revenue from the current $0.23 per passenger in 2018, to $2.82 in 2028, reaching $4 per passenger by 2035. With current traditional ancillary revenue for airlines of around $17 per passenger, the research study projects that broadband connectivity will add around 24% to ancillary revenues for airlines in real terms by 2035.

Growth in broadband-enabled ancillary revenue will be driven by the introduction of new generation on satellites. These address the key requirements sought by passengers that have been lacking to date in many cases, most importantly high bandwidth and continuous connectivity. Passenger surveys continue to confirm that these are integral components of quality, which remains the primary driver of broadband take-up, and that passengers are willing to pay more for high quality onboard connectivity.

When combined with a well-developed ecosystem of content, products and services, this can spur the development of related ancillary revenues from both leisure and business passengers on Low Cost Carriers and Full Service Carriers. Globally, Low Cost Carriers (LCCs) are forecast to account for around $11 billion of revenues, and Full Service Carriers (FSC) around $19 billion. The capitalisation of opportunities presented by a connected cabin with high quality continuous coverage will depend on the degree that airlines are willing to engage with third party suppliers, retailers, destination companies, content providers and others.

The research study forecasts that by 2035, from the estimated $30 billion airline share of the total broadband-enabled revenue of $130 billion, Asia Pacific has the highest figure at $10.3 billion, followed by Europe with $8.2 billion, North America with $7.6 billion, Latin America with $1.9 billion, Middle East at $1.3 billion and Africa with $0.58 billion.

The opportunity for revenue growth from broadband enabled services is dependent on airlines commercialising passenger data to a much greater degree than occurs currently. Today, only 11% of existing airline schemes offer personalised rewards based on purchase history or location data. More loyal customers can generate a 23% premium in profitability and revenue to airlines. Airlines today have failed to fully develop the potential opportunities offered by passenger data. Airlines are in the driver's seat for realising a massive opportunity. By bringing together right technological, retail, advertising and content partners, airlines will be able to offer passengers the services they are asking for, whilst improving the bottom line. With the number of passengers currently flying every day forecast to almost double by 2035 this is a 'sky high' multibillion dollar opportunity for the global airline industry.

Broadband in the Sky by Robin Mansell

Professor of New Media and
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Economics and Political Science

Networked information technologies and solutions are an integral part of everyday life in the 21st Century, producing a major demand for connectivity. This demand is extending the desire for connectivity: to be always and everywhere connected. Amplifying this demand is the increase in the mobility of people, with total domestic and international passenger air travel journeys exceeding 3.8 billion.[1] The demand for connectivity is the driver for massive investment in mobility, with $880 billion invested in telecommunication infrastructure worldwide over the past five years, and global smartphone sales of $1.8 trillion over the same period.[2] Access to the internet increasingly is with smartphones and tablets for personal use, and the trend toward mobile or ubiquitous computing and communication is also mobilising the workplace and blurring the boundaries between workspace and living space – professional and social. Mobility is an extension of the communicative capacity of individuals and is now a familiar feature of everyday life.

Mobility and the proliferation of Cloud services provide the ability for individuals to consume media, work and communicate 'on the move' or at a distance. Maintaining the connectivity that makes this possible is becoming an expectation but progress in providing this is uneven. Different rates and consistency of data transmission are experienced in all mobile telecommunication networks leading to user concerns about quality, and major gaps in connectivity remain. These gaps are particularly apparent in the transit between urban areas, with long distance travel typically involving prolonged 'outages' or degradations in connectivity. At the same time, users are likely to expect connectivity to be present in an ever greater number of locations, both free and via subscription. These developments make any 'in transit' outages experienced by passengers during long distance travel more conspicuous. An individual may choose to defer connection during travel. However, since modern working and social lives involve a high level of communication, immediacy, and a sense of urgency to work or engage in communication or entertainment, the trends towards higher levels of mobile connectivity may indicate a willingness to pay additional charges for connectivity.

The availability and reliability of connectivity influences the degree of engagement people have with their online personal and work domains, and the extent to which these are utilised. Inflight wireless broadband provides the opportunity for individuals to continue their engagement with these domains inflight. A high-reliability service that provides an end to the inflight blackouts that are often experienced, and maintains

connectivity when individuals are airborne, will enable those who value this continuity to pay for inflight services. Those for whom this is a requirement, including many business and corporate flyers, are likely to welcome the ability to remain productive inflight while also enjoying the social and recreational opportunities available to them through online connection. There are others who may prefer a free-access model, including some younger travellers whose experience is mainly with free access to Wi-Fi or others who are unwilling to pay for faster connectivity, greater data provision, premium services, and other features. However, the share of the air travelling population with a willingness to pay for inflight broadband is likely to increase due to the defining nature of connectivity in people's lives, the value of online connectivity for conducting work, and the role that connectivity plays in maintaining and extending social and professional networks. For all of these applications the terrestrial services available at a journey's end, with inclusive tariffs at high speeds, for many provide a benchmark for cost and quality. As a result, the quality of an inflight broadband service must be high – in practice, indistinguishable from the service likely to be received in a modern business traveller hotel.

The value of connectivity may be translated into business models in several different ways. A comparison is wireless broadband connectivity in business hotel accommodation. Although initially a differentiator that created competitive advantage for hotels offering such services, a wireless broadband service has become a common expectation and a cost of doing business, not only for business traveller hotels, but for almost all accommodation, although, in some cases, there are limitations on the 'free-time' provided, data download speeds and other restrictions. The provision of inflight wireless broadband is an added cost for the airline, and the extent of deployment will influence whether this service is a differentiator, a common facility (treated as a cost of providing air travel services that is incorporated in airfares), or an opportunity to generate additional revenue for the airline as new digital channels emerge enabled by broadband in the cabin.

A comparison with the development of mobile telecommunication services and the earlier history of internet service provision suggests several options for airlines in the provision of broadband for passengers. The simplest for the user seeking persistent online connectivity is a limited offering of inflight online service based on a portal or 'walled garden' used to generate revenue through pay-per-view services and advertising content. A second is for airlines to provide connectivity but to limit access to higher bandwidths which can be used for services such as video streaming. Limitations can be imposed by charging premium prices or by using technical barriers like those imposed by mobile telephone operators which charge by the amount of data accessed and do not assure the user that higher bandwidth services will work. The third strategy is to strive for comparable levels of connectivity to terrestrial wireless broadband connections and to charge a flat rate for such access or to provide it for 'free'. The viability of the free option will depend on whether airlines find sufficient revenue offsets in providing advertising, online shopping, paid inflight entertainment and user data collection for internal use or resale or other areas of revenue to pay for the costs of the service.

Many users will welcome the extension of online connectivity to air travel, one of the few spaces in which connectivity options are currently limited. The mobile internet market is maturing rapidly with users becoming intensely reliant upon and engaged with their network-enabled devices. Gaps and reliability problems still limit the user experience of online mobility with quality (consistency) rapidly becoming an expectation among passengers. Opportunities for airlines are opening up as a result of the additional services that a broadband-enabled cabin can create. At the simplest level, a tiered paid-for and free service can be offered. More complex services and offerings can be added to these. The provision of inflight services offering comparable quality and consistency to terrestrial coverage will be influenced by the tension between user expectations for free broadband access or a charged-for service and the strength of user demand by those who are unable or unwilling to defer or interrupt their connectivity during aircraft travel. The consistent attribute among these groups is that connectivity is becoming the norm, not the exception.
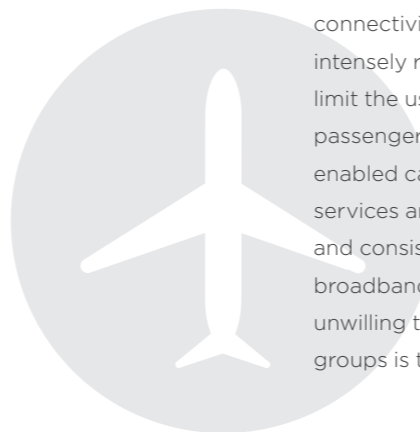
Dr Alexander Grous Biography

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Dr Alexander Grous has been engaged at the LSE since 2005, and works across the Department of Media and Communications at the LSE in a combined teaching and research role in the areas of Innovation, Socioeconomics, Communication Technology and Transport Economics, amongst other areas.

Dr Grous is also Director of the Research Function in LSE Enterprise, engaged across multiple projects for clients. He brings considerable commercial experience to the LSE from previous roles at CxO level in mobile communications (including satellite), high-technology, FMCG, e-commerce, Banking and Finance.

Dr Grous specialises in the quantification of socio-economic value encompassing both a social and economic impact at the company level, regional, national level, or wider. His extensive work in these areas has resulted in high profile reports and media coverage including the impact of cycling to the UK economy, business and health; the socioeconomic impact of mission critical broadband to the UK and the EU; the productivity-enhancing impact of communications in the UK, and recent extensive socio-economic work for FTSE 100 firms that are not public domain including Microsoft, Warner Brothers, Amadeus, GB Group, and others.

Dr Grous' work is often utilised for Policy and Government input, and he engages at this level to facilitate. Dr Grous also brings considerable experience in telecommunications having held strategy roles in mobile strategy and satellite communications with Telstra (Australia/UK) including engagement over two years with Inmarsat in the UK as Telstra's representative on the Working Group related to the initial development of Inmarsat's mobile satellite service.

He was also MD of Lockheed Martin's Infocom Division for EMEA and CEE/CIS including participating in satellite communication launches and joint ventures for fixed, mobile and broadband in the region, defining the market potential for services across ground and air. Dr Grous maintains transport economics and communication technology as an active area of research and teaching.

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Overview

" We are pushing the airlines to have the same mind-set as Amazon, which is a recommendation engine. But this means a change of mind-set. "

Raphael Bejar, CEO, Airsavings[3]

The need to 'always be connected' has continued to grow in the 21st Century, across both business and social segments.[4] Ubiquitous connectivity is no longer the domain of business travellers as Generation Y and Z have normalised the ingrained nature of mobile connectivity.[5] As connectivity no longer becomes an exception in everyday life, the focus is shifting to areas where it is often less available, including travel.[6] Over 70% of consumers utilise their mobile devices during the week across environments including home, work and when commuting and traveling, with 63% of global consumers willing to pay for mobile broadband value added services. 'Video' is one of the most requested services, with research indicating that over 60% of consumers would like video to be optimised further than present quality.[7] The most requested aspect of mobile broadband continues to be *quality of experience*.[8] Almost 80% of global consumers experience issues with mobile connectivity that directly impacts their utilisation including slow speeds (62%), network coverage (39%), and connection drops (36%).[9] These contribute to mobile churn rates between carriers of around 31% across countries, with reliability, coverage or speed impacting utilisation and retention.[10]

Broadband connectivity 'in the sky' represents a significant opportunity for the generation of ancillary revenue that is currently in its infancy or absent from the commercial aviation sector. The market today is not necessarily the market that will be there tomorrow as step-changes are occurring in trends and dynamics that have the potential to augment the current 'traditional' model of ancillary revenue. Broadband connectivity offers the opportunity for a step-change encompassing both digital and e-tailing opportunities. This expands the more 'traditional' ancillary revenue opportunities focused to date on four primary areas: frequent flyer mile sales, travel retail sales (car rental, hotels, insurance), baggage fees and onboard a la carte sales, estimated to be worth $67 billion.[11] Mobile broadband has the potential to be a disruptor, however, and foster opportunities that leverage changing social, economic and technical factors that can potentially migrate the onboard and operational experience 'to new heights'. These can generate additional benefits for airlines by 'monetising' passengers to a greater degree, whilst concurrently enhancing their end-to-end travel experience and generating greater loyalty in the process. As a result, airlines can gain a higher net present value (NPV) per passenger and maximise the return on investment (ROI) in onboard broadband connectivity. If the onboard connectivity experience begins to approach or equal terrestrial broadband, the playing field can be levelled at the very least between the two, creating significant opportunity for the aircraft cabin to generate high broadband-enabled ancillary revenue. This outcome can usher in purchasing behaviour that is the same between the two environments, making it possible for airlines to dramatically expand their shopping offers beyond the narrow sample offered today. Critically, this moves away from the current duty-free basket of goods offered to a wide portfolio of products.

Research indicates that when broadband is offered in the cabin, some consumer expectations are carried with them and rank higher in affecting their adoption of the service. In particular, over 75% of airline passengers value reliability over price (19%) and speed (6%).[12] With more than half of all data traffic estimated to be streamed by 2020,[13] a reliable and consistent grade of broadband service by airlines can generate additional revenue opportunities and also influence loyalty.[14] Around ten million people are estimated to fly each day, up from eight million in 2013.[15] The potential for this group to generate revenue is high if they are provided with the appropriate onboard connectivity, content, and pricing. With 1.6 billion people spending $1.9 trillion on e-commerce in 2016,[16] a similar per person annual spending profile of $1,188 in the air could yield significant sales today, with some forecasts estimating this at around $2.5 billion.[17] The key enabler is the creation of high bandwidth, reliable connectivity that facilitates a paradigm shift in thinking by both airlines and passengers alike, where the distinction between on-the-ground broadband blurs, or disappears altogether. If used strategically, loyalty programmes can enhance this further: only 11% of existing airline schemes offer personalised rewards based on a customer's purchase history or location data today, providing significant room for improvement.[18]

Market Drivers

" There's nothing more frustrating for a passenger than being told it's there and you're waiting there with your screen to upload or refresh. "

Willie Walsh, CEO, IAG.

If a broadband service is offered by the airlines that meets or exceeds passenger expectations, this can result in greater loyalty: greater loyalty amongst consumers can deliver a 23% premium over the average customer in terms of profitability and revenue.[20] After experiencing better service, loyal customers have been observed to focus less on price and more on the rewards of the experience ('quality') and convenience, resulting in revenue gains.[21] Loyalty from a better service experience can diminish price sensitivity, contributing to an increase in long-term revenue and profitability.[22]

Increasingly, the mobile channel has become an important engagement mode for many consumers with both their loyalty programmes and travel providers, including airlines. Facilitated by the development of apps and direct bookings: in-app bookings account for 12% of total mobile bookings for travel worldwide,[24] with mobile bookings for air travel on average 21% higher than desktop bookings, and 13% higher for car rental.[24] In the US, 83% of passengers have a smartphone, whilst 15% travel with three mobile devices (mobile phone, table, laptop),[25] offering pre and post-departure revenue opportunities with this mobile medium. This can be maximised if airlines utilise a greater degree of personalisation: consumers today are more willing to receive and act upon online and mobile personalised offers.[26] This can lead to a sales uplift for e-retailers with results indicating a 12% increase in the average order value for personalised transactions versus sales without personalisation.[27] The key contributing factor to the success of online personalisation is the acquisition and use of detailed customer information.[28]

The shift from a more 'traditional' ancillary revenue model to a broadband enabled model encompassing e-commerce, destination shopping, entertainment and other elements is in its early stages but offers growth opportunities for airlines.[29] These can be driven by a number of factors:

- Around half of all passengers between the age of 18-51 require onboard connectivity;[30]

- Business passengers display a propensity to pay $10 for broadband connectivity for flights up to three hours; $20 for up to five hours, and $25 for greater than five hours;[31]

- The trend to quality vs price is also observed amongst millennials, who represent a $290 billion market in the US and the most connected generation: 44% indicate that they are loyal to brands they buy, with 52% choosing quality over price;[32]

- 85% of millennials own a smartphone and spend the highest proportion of time on this versus other segments, at 15 hours per week;[33]

- Around 28% of retailers report that customer loyalty increased through the deployment of in-store customer Wi-Fi[34], denoted as wireless access to broadband.

Significant variation in the price that airlines are charging for broadband connectivity is observed. This is also currently the primary ancillary digital revenue for the majority of airlines, with advertising revenue, premium content, and personalised revenue in its infancy: the majority of airlines have not capitalised on such opportunities, often due to the lack of bandwidth and its reliability and quality. Optimising consumer take-up of these and other related opportunities requires the marketing and delivery of ancillary services with an appropriate fit with the mobile and onboard technology that facilitates their commercialisation.[35] The initial growth in the market is dovetailing with new opportunities, such as enabling broadband technology for airlines, aligning with passenger expectations and technical improvements in technology. Figure 1 depicts the evolution of passenger expectations for broadband in the cabin, and the commensurate airline opportunities that can be capitalised upon, underpinned by market, social and technological trends.
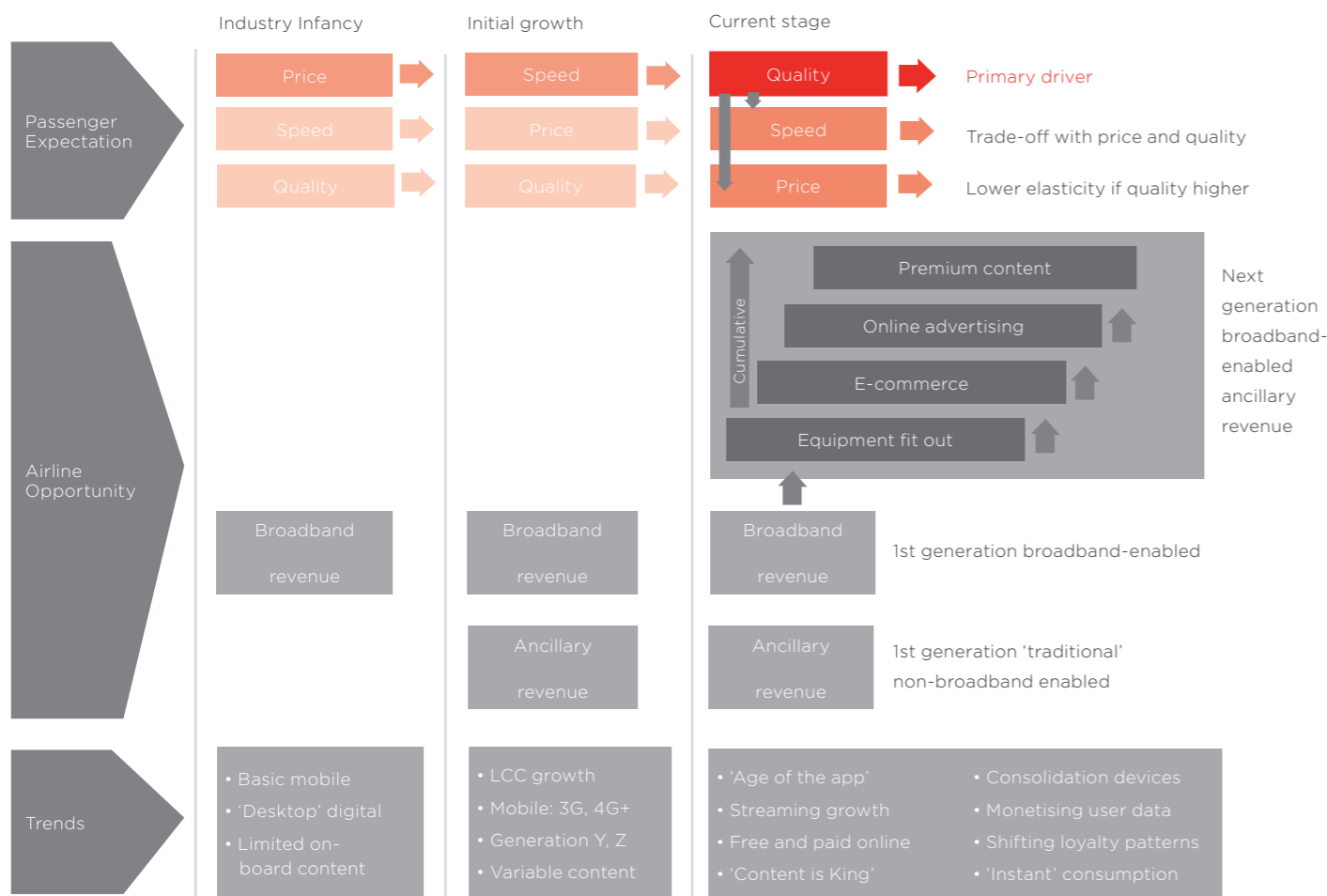
Figure 1: The evolving airline ancillary revenue model

Quality appears to be the most significant enabler, with passengers indicating a preference for a number of related attributes:[36]

• A service with seamless connectivity across large areas;

• A lack of persistent buffering to enable higher bandwidth applications such as streaming;

• A lack of persistent drop-outs of connectivity;

• A lack of buffering;

• Higher speeds capable of delivering video and interactive services with a quality of experience comparable to high-speed terrestrial bandwidth.[37]

In order to fully capitalise upon the opportunities offered by high quality cabin broadband, airlines need to improve their current passenger data utilisation, which is often limited.[38] This involves the greater use of data held by airlines from bookings, current non-broadband-enabled ancillary revenue, frequent flyer profiles, apps, and other sources.[39] Airlines are not, in general, fully utilising passenger data to maximise revenue. A change in this strategy can complement a broadband-enabled cabin, however, and drive related ancillary revenue with airlines capitalising on a number of areas:

• Utilising extensively held consumer preference information;

• Identifying target travelers;

• Offering opportunities to purchase ancillary services using multiple access devices including mobile phones, laptops, and tablets to facilitate pre-flight, onboard and post-flight activities;

• Exposing passengers to multiple revenue-generating modes including advertising across platforms and types (mirroring their terrestrial experience);

• Identifying a sub-set of passengers who can act as innovators in their particular consumer segments and become 'ambassadors' for using the technology for other passengers, generating 'word-of-mouth' and referral feedback through travel websites, airline forums, and social media;

• Broadband-enabled ancillary services that can be personalised to enhance the passenger's air travel experience.

These areas are relevant in facilitating the broadband-enabled generation of ancillary revenue from both of the major airline segments: Low Cost Carriers (LCC) and Full Service Carriers (FSC). Discussions with airlines and secondary research indicates:

• A blurring has occurred in the airline type selected by many business passengers, with LCCs and FSCs often selected based on price, route and schedule: airline status (LCC vs FSC) does not appear to be as prevalent a factor in selection;

• Business passengers travelling on LCCs are creating demand for elements of travel expected with FSCs such as preferential status for boarding; priority bag tagging; additional carry-on baggage and allowances; and other factors;

• Demand for connectivity, with many business passengers expecting their airline to offer broadband;

• Many budget travelers choosing FSCs are also expecting free broadband and a free selection of entertainment, contrasting with business travelers in the main;

• Global recessions have resulted in many companies mandating that their business travelers seek the lowest cost for travel and accommodation spurring a crossover of some travel to LCCs.

The ancillary revenue model is particularly suited to LCCs, who have in the main pioneered the 'a la carte' concept as the core of their ancillary strategy. As such, passengers flying with LCCs have experience with an add-on approach for additional services or features. These airlines may also exhibit better adaptability at implementing broadband-enabled ancillary services as a result, and stronger passenger take-up. In addition, LCC leisure passengers, and in particular holidaymakers, are likely to have a greater propensity to spend than some other leisure and business travelers. It is expected that LCCs will continue to penetrate the market above the current 28%-60%[40] observed in Europe, North America,[41] Asia Pacific and Latin America.[42] Continued pressure from corporate travel departments is expected to result in further dilution between the choice of an LCC or an FSC with over 85% of business passengers indicating that lowest-cost travel was the primary factor defining the choice of a carrier.[43]

Primary research indicates that 85% of passengers can be influenced to make a purchase in a connected cabin if they have confidence that a pool of relevant content and products exists:[44] *liquidity of supply*. This 'liquidity' encompasses airlines offering a pool of products and services to a passenger at terms that can stimulate a purchase. To be optimised, liquidity needs to be combined with 'attractive' pricing and fulfilment that caters for the immediacy of some purchases, such as digital confirmation of destination hotels, flights and car hire, in addition to non-urgent deliveries. Figure 2 depicts how these factors can create passenger confidence to defer purchases until onboard. This is analogous to the online person-to-person (p2p) betting market in which liquidity and better odds drive the confidence for individuals to seek this out and bet versus alternative options.
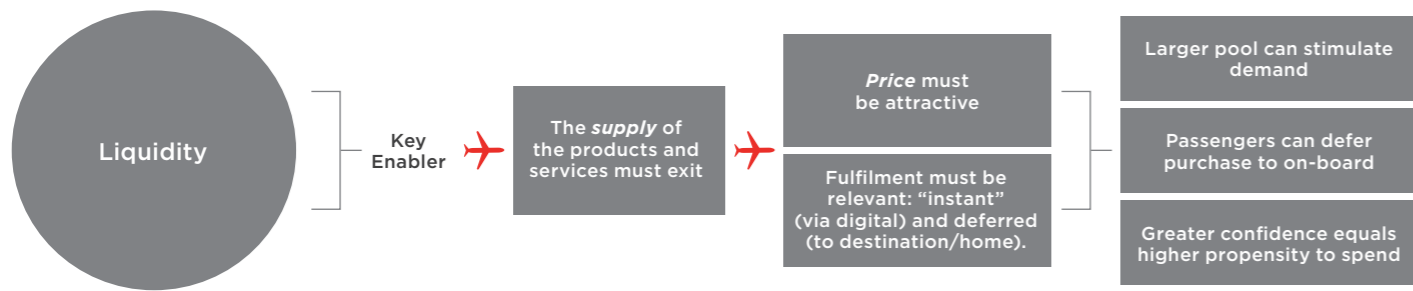
Figure 2: Creating passenger confidence through liquidity, price and fulfilment

This research assesses low-cost, full service carriers, leisure and business passengers, and their forecast propensity to undertake broadband-enabled spending when onboard. Secondary and primary research was undertaken to define relevant contributory factors affecting take-up rates between segments for broadband-enabled offerings in the cabin.

Research Approach

Existing research and data on airline ancillary revenue overwhelmingly focus on the 'traditional' model of opportunities available to airlines that in the main are not facilitated by broadband. A gap exists in the quantification of opportunities that passenger connectivity facilitates. This report seeks to identify and quantify a number of potential areas of opportunity that have been narrowed following exploratory primary research with passengers, consumers, some broadband technology providers and secondary data sources. The methodology used commences with an identification of the regions to be utilised and the definition of the ancillary revenue services and their assumptions. Figure 3 depicts the overarching methodology.
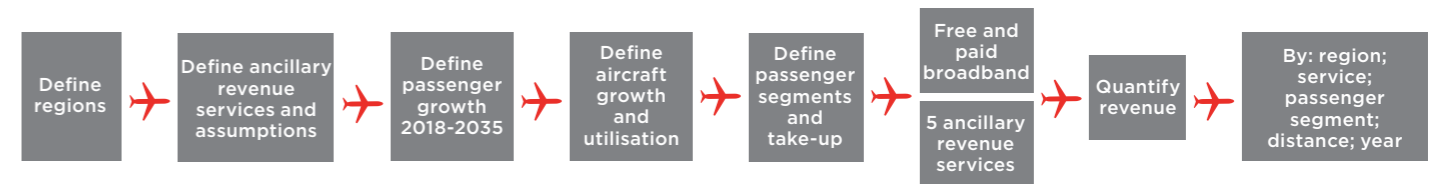
Figure 3: Demand and revenue quantification approach

Six geographic regions have been utilised: *North America, Latin America, Asia Pacific, Europe, Africa and the Middle East*. Four broadband-enabled service opportunities have been defined and assessed for each region, as depicted in Figure 4. In order of potential forecast market size, this includes broadband access revenue; e-commerce & destination shopping; advertising (almost equal between page impressions and interrupting adverts), and Premium Content and Devices. The forecasts utilise regional demand inputs such as passenger travel growth, with IATA-obtained passenger forecasts for 2016 and 2035 indicating a near doubling of global passenger numbers from 3.8 billion to 7.2 billion respectively.[45] These forecasts were extrapolated to yield regional forecasts from 2018-2035 by region, reaching a global figure of 7.2 billion passengers in 2035, as forecast by IATA. Within the forecasts, segmentation between domestic and international travel occurred, and between LCC and FSC passengers and the revenue that each segment generated.

> " I don't think I know how to live without Wi-Fi. I'm always on my phone, laptop or tablet. Often at the same time. It is important to everything that I do. Messaging friends on WhatsApp, Facebook or even looking for jobs on LinkedIn – it's online. I can't remember the last time I watched TV in real time or took a photo and didn't think Instagram! It makes me chuckle that my parents leave the house to buy a newspaper. Why would you? Everything I need is in my pocket just a tap away. Taking that away from me at times like a long flight is tantamount to torture."
>
> Millennial
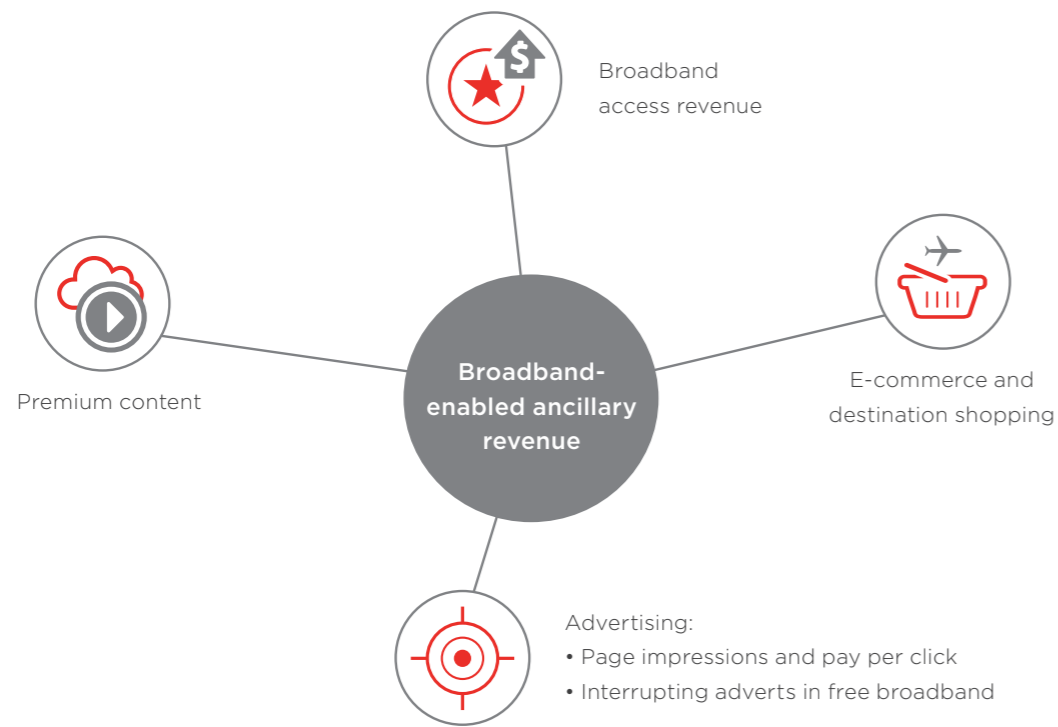
Figure 4: Identified areas of opportunity for airline broadband-enabled ancillary revenue

These represent a mix of existing broadband airline ancillary revenue and new opportunities. They are predicated on existing passenger engagement with digital modes such as websites, e-marketing campaigns, e-tailing and other 'everyday' digital experiences.

Broadband Access Revenue

This is the most widely utilised revenue generating category for airlines and technology and service providers for inflight broadband connectivity. Most of the airlines today derive revenue from access charges with multiple options often available including charges per hour; per day; per flight; defined data amounts, and other options. These are driven by the strategy of the airline, which in some cases provides some connectivity without charge, but with options available for 'upgrading'. They are provided through a mix of direct and indirect channels to the airlines. This research has defined a range of access charges available today and draws on interviews and research to define take-up rates relevant to each region.

Advertising

This category has been segmented between revenue from page impressions and click-through in both paid and free broadband options, and revenue from interrupting-adverts for free broadband. Pay per click is one of the core areas of online revenue generation, the familiar practice of clicking on adverts placed on pages. The development of commercial opportunities with providers of content could generate revenue for adverts viewed by airline passengers on a revenue-sharing basis with the potential to offer tailored adverts and content specific to routes, destinations, target passengers (e.g. business vs leisure flights) and other criteria. The additional area of revenue generation is the free access model that interrupts content with short adverts as utilised by *YouTube, Spotify, SoundCloud* and others. Utilising data and assumptions derived from this sector, revenue generation has been forecast for ad-supported 'free' broadband access. Technical and operational challenges exist in the initial establishment of this area, such as ensuring that revenue from interrupted streamed content is attributed to the airline when sharing revenue with content providers. If these elements can be addressed, this segment offers strong revenue generation opportunities. As this segment evolves, further opportunities could also be developed from sponsored participation by advertisers and other organisations. The ultimate development of this segment could encompass a portfolio of these areas.

Premium Content

Some airlines currently stream content and offer premium options utilising bring-your-own-device (BYOD), although this is limited at present. This opportunity encompasses premium live content, on-demand video, and bundled Wireless Inflight Entertainment Connectivity (W-IFEC). It represents a potential growth area by offering passengers topical content charged over and above that provided by any Inflight Entertainment (IFE) as a standalone premium service. Although this may be unconnected to broadband, Wi-Fi enabled Inflight Entertainment (W-IFE) can be offered as a premium priced add-on to IFC, despite the content not utilising broadband. This would occur through the content being streamed to the aircraft via satcoms, with a premium paid by passengers for live broadcasts such as sporting events, live TV soap operas, and others. In addition, this service could include continuously streamed premium content being delivered to the passenger. This opportunity represents ancillary revenue enabled by broadband, with content streamed to the aircraft and accessed on BYOD or via the aircraft's static inflight connectivity system. This offering can take the form of a tiered pricing model: basic content could include news, shows, or other content, whilst premium content could include events, specially negotiated content such as 'box sets' or other content. Higher bandwidth could enable airlines to dynamically change or update content onboard to complement an aircraft's route, flight duration, passenger mix, and maximise revenue opportunities.

E-commerce and Destination Shopping

'Traditional' ancillary revenue includes some destination and e-commerce shopping by passengers. In this model, broadband is not the enabler: passenger activity before the flight and inflight purchases are the primary drivers. In the emerging e-commerce model facilitated by inflight broadband, passengers can be targeted via a number of modes that take advantage of a captive market, such as late bookings and opportunistic purchases. Passenger purchases have been reviewed to define a package that represents destination purchases of two of the most popular items: car hire and hotels. An additional representative component of 'leisure' purchases has been defined that can encompass tours, transfers and goods ('e-tailing') and other items promoted by the airline. This opportunity, encompassing duty-free purchases enabled by connectivity, has the potential to generate significant revenue above those forecast, if the airlines can establish the appropriate partners and suppliers for goods and services. A key distinguishing feature of the revenue-generation potential of this category is the ability of the airlines to personalise offers based on passenger knowledge, particularly if the passenger is utilising the airline's app to manage the flight. A second feature capitalises on the penetration of logistical 'giants', such as Amazon and other in-country category leaders, that can provide fulfilment to an end-destination or conversely, back to a passenger's home. Degrees of take-up have been estimated and penetration of this category to define its potential.

Aircraft growth forecasts were utilised to define 2016 and 2035 estimates by region utilising the starting point of aircraft in operation in 2016 (22,510 aircraft), increasing to a forecast of 45,180 aircraft by 2035.[46] Aircraft connectivity rates ranged from an average of around 25% in 2017, increasing to a forecast of around 50% by 2025, reflecting a mix of available data and forecasts.[47] Following a review of aircraft operational data obtained from sample airlines and engagement with industry resources, a number of stages were defined to estimate aircraft growth, utilisation, and other metrics as depicted in Figure 4.

Figure 4: Aircraft and passenger analysis activities to estimate ancillary revenue forecasts

As social and economic trends align with technology and a broader ecosystem of suppliers, logistical organisations, and others the opportunities for airlines and suppliers of content (physical and digital) can monetise demand and create tangible returns from a connected cabin. As passenger growth occurs, strong take up of connectivity has been factored, underpinned by the next generation of satellites that have entered service and are forecast to continue providing the critical success factors believed to drive growth.

Airline Passenger Growth

The development of global airline passenger traffic forecasts utilised publicly available data for a number of anchor years with extrapolation occurring between these. Data were obtained from IATA for passenger forecasts for 2016 and 2035 of 3.8 billion and 7.2 billion respectively, and for an estimate of the distribution of passengers for some regions for these dates.[48] Additional data and feedback were obtained from discussions with industry resources and from multiple other sources including government statistical information, industry bodies in regions, and others, to estimate the distribution of passengers for the remaining regions between these dates, including between domestic and international passengers.[49] Where data were not available, assumptions were made on the distribution of passengers using other available data points to yield overall passenger traffic forecasts between 2018-2035, segmented by region and by domestic versus international passengers, including LCC versus FSC travel. The forecasts were also aligned with those from organisations such as IATA.

The potential revenue forecasts estimated in this report indicate that Asia Pacific is the largest market, accounting for 42% of traffic as well as forecast to be one of the major growth markets, accounting for over 50% of new passengers by 2035.[50] Europe is likely to be marginally larger than North America as the next biggest market in 2035, with these two regions forecast to account for 21% and 18% of total passengers respectively. Latin America is forecast to account for the next largest market (9%), followed by the Middle East (6%) and Africa (4%). These forecasts are within 1% of other sourced region estimates for 2035.[51, 52, 53] Analysis has defined passenger forecasts in 2035 of 3.1 billion for Asia Pacific; 1.5 billion for Europe; 1.3 billion for N. America; 0.658 billion for Latin America; 0.414 billion for the Middle East and 0.303 billion for Africa. This forms the initial stage in quantifying broadband-enabled ancillary revenue for airlines, with this data utilised to define adoption, demand forecasts and revenue.

> "The expectation from passengers before was: 'Give me something to entertain myself with'. Now they are just saying: 'connect me'."[54]

G. Saretsky, CEO, WestJet.

Ancillary Revenue Forecast Summary

Four broadband-enabled airline revenue opportunities have been identified and forecast. In order of potential market size, this includes (1) broadband access revenue; (2) advertising via page impressions and interrupting adverts for content; (3) e-commerce and destination shopping; (4) premium content. The opportunity for each of these has been quantified. In 2018, the broadband-enabled ancillary market will still be in its relative infancy, although onboard connectivity has been offered for a number of years. Table 1 summarises the total revenue estimated, and the proportion accruing to the airlines.

Ancillary Revenue	2018		2028		2035	
	Revenue	% of total	Revenue	% of total	Revenue	% of total
Advertising	$48,733,691	5.98%	$5,540,353,422	8.32%	$10,706,212,518	8.18%
Broadband Access Revenue	$3,290,566,450	66.50%	$36,254,590,888	54.47%	$63,675,993,215	48.65%
Streaming and Devices	$78,682,487	3.98%	$1,724,989,166	2.59%	$3,250,234,177	2.48%
E-Commerce: Destination Shopping	$442,883,408	23.55%	$23,040,989,877	34.62%	$53,245,035,926	40.68%
Total Market Revenue	$3,860,866,035		$66,560,923,353		$130,877,475,836	
Airline Proportion	$925,518,156		$15,901,909,247		$30,082,080,853	

Table 1: Broadband-enabled ancillary revenue by service and as a proportion of total revenue

Airlines are forecast to generate $0.9 billion in 2018 in broadband-enabled ancillary revenues, with almost all of this accounted for by access revenue, from a total forecast market of $3.8 billion, with the remaining proportion generated for providers of broadband capacity in the main, some content and goods and services providers. This is forecast to grow to $15.9 billion and $30 billion for airlines by 2028 and 2035 respectively, and a total market of $66 billion and $130 billion respectively. Chart 1 illustrates the forecast growth of the broadband-enabled ancillary revenue market for the airlines.
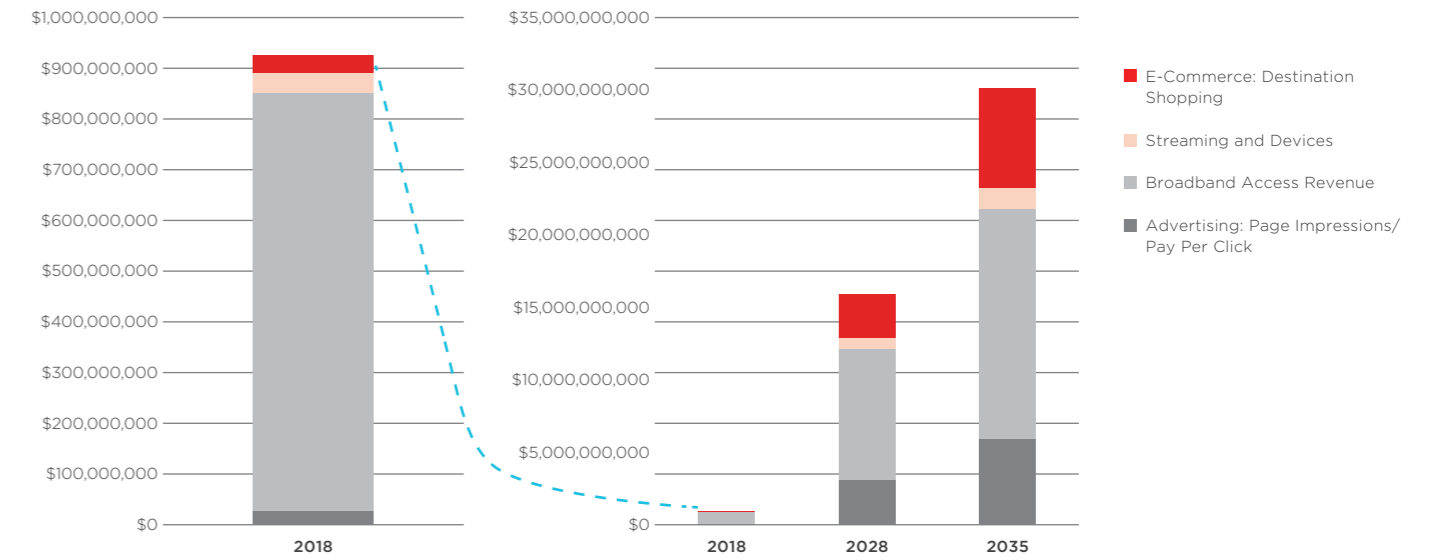

Chart 1: Forecast airline broadband-enabled ancillary revenue: 2018, 2028, 2035

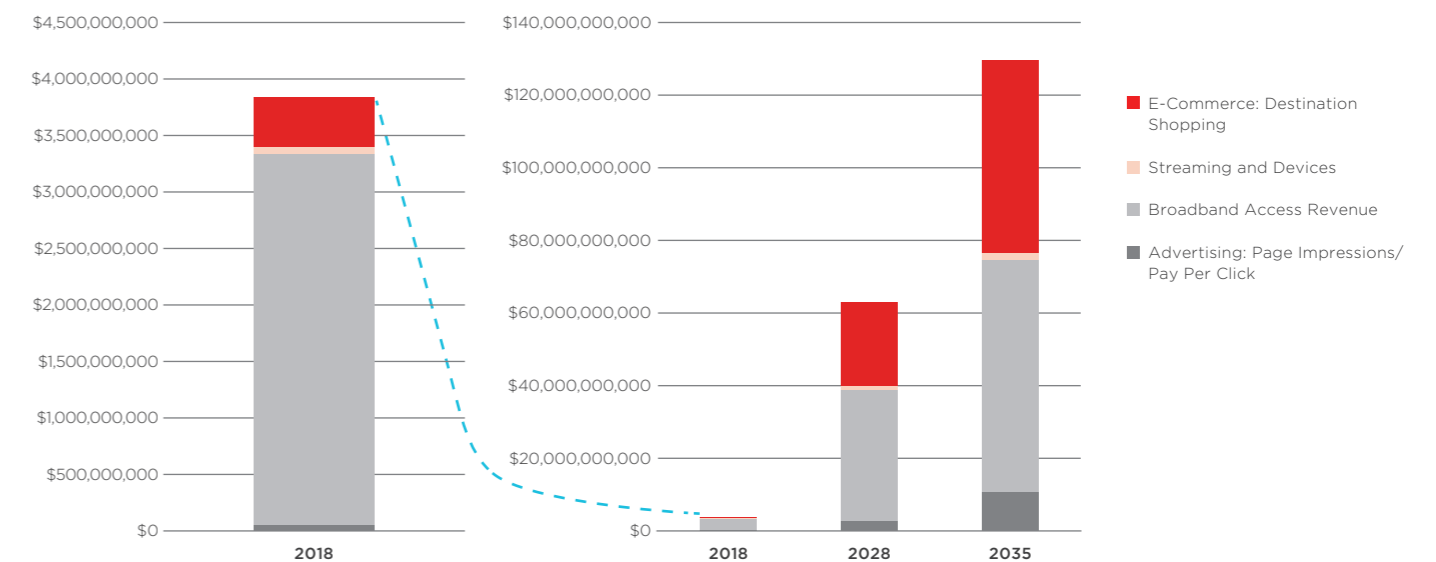The forecast total market growth generated by broadband-enabled ancillary revenue, is depicted in Chart 2.

Chart 2: Forecast market revenue for broadband-enabled ancillary revenue: 2018, 2028, 2035

The consolidated 10-year total market forecast revenue encompassing the four ancillary services enabled by onboard connectivity is presented in Table 2. This reflects a global broadband-enabled ancillary revenue market of $3.8 billion in 2018, growing to $66 billion by year 10, 2028.

	2018	2019	2020	2021	2022	2023
Total Market Size	$3,860,866,035	$6,502,994,035	$10,294,901,001	$16,357,783,272	$23,182,819,726	$27,607,226,355
Airline Revenue	$925,518,156	$1,606,664,891	$2,517,120,926	$3,891,721,978	$5,549,934,929	$6,619,624,004

|	2024	2025	2026	2027	2028
Total Market Size	$34,376,538,780	$43,011,199,340	$52,258,117,997	$56,324,093,252	$66,560,923,353
Airline Revenue	$8,205,830,239	$10,211,528,436	$12,554,297,607	$13,560,711,128	$15,901,909,247

Table 2: The growth of broadband-enabled ancillary revenue market and airline share: 2018-2028

The forecast airline revenue component of this is $0.92 billion in 2018, comprised of revenue sharing from advertising, e-commerce and destination shopping, and broadband access activities. This is forecast to rise to $30 billion by 2035 as depicted in Chart 3, from a total market forecast of $130 billion by 2035.
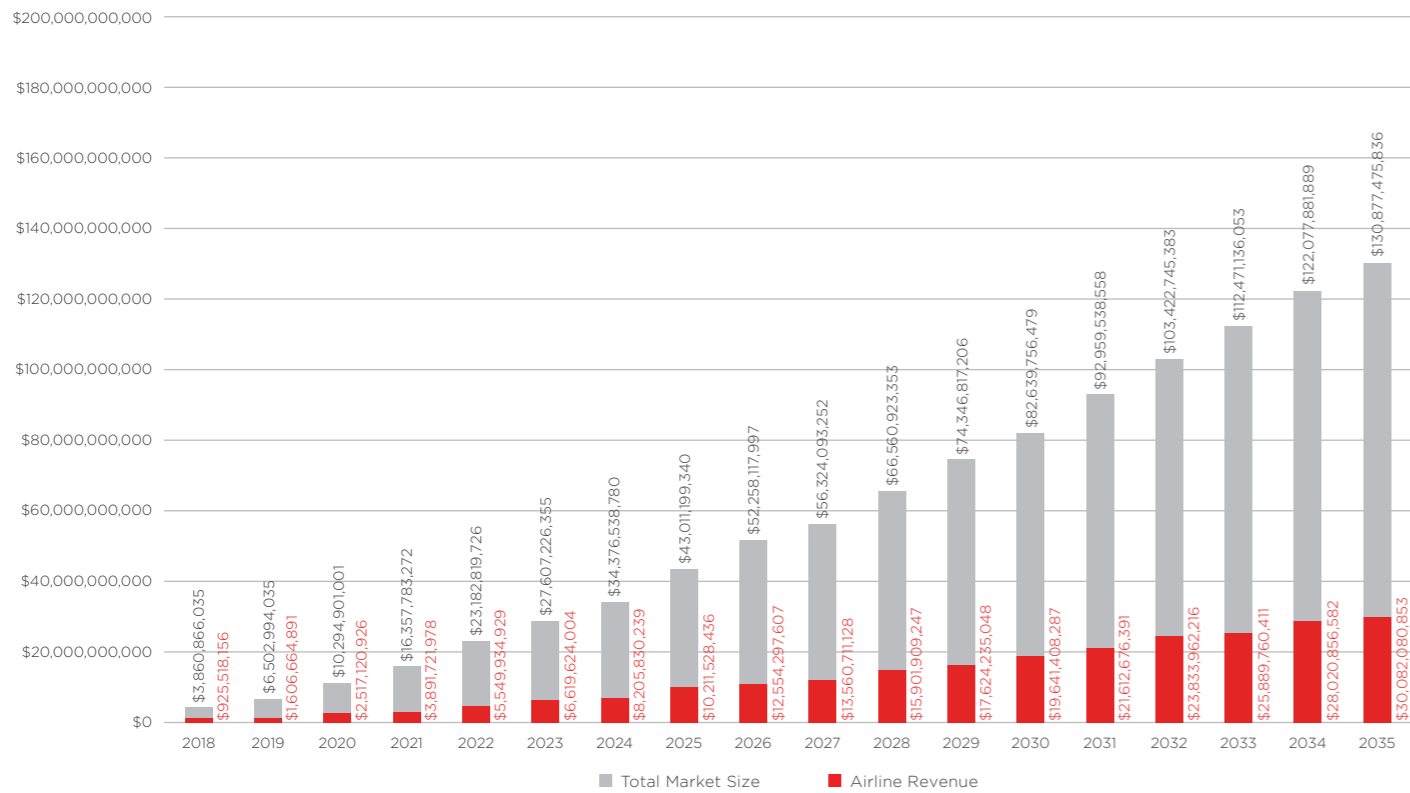
Chart 3: The growth of broadband-enabled ancillary revenue market and airline share: 2018-2035

Chart 4 depicts total revenue and airline revenue for broadband-enabled ancillary opportunities in 2018, 2028 and 2035. This depicts a more accelerated growth forecast as a greater user base is generated and penetration of both paid and free onboard broadband access increases concurrent to the penetration of services.
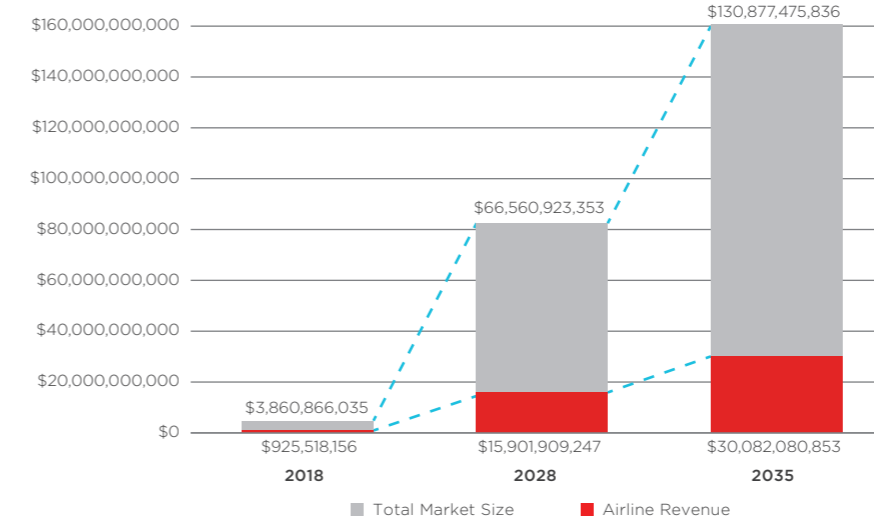
Chart 4: Broadband-enabled ancillary revenue market and airline share: 2018 2028, 2035

Revenue has been defined by both domestic and international travel from the five major regions, and segmented further by LCC and FSC. Table 3 summarises forecasts for domestic travel for LCC and FSC ('LCC-Dom' and 'FSC-Dom' respectively), and for international travel ('LCC-Int' and 'FSC-Int'). Variation exists internationally between airlines on how they define short haul, long haul, domestic and international flights.[55] Due to disparate data sources and these varying definitions on short haul, medium haul, long haul and 'regions', a simplified approach has been utilised to consolidate and harmonise data against narrowed definitions. Two categories have been utilised: 'Domestic' and 'International'. Domestic includes short haul flights, whilst International includes medium and long haul. 'Regions' have not been utilised to denote 'Domestic'. It is recognised that in some cases, this will result in a skewing of flights to be classed as international, such as within Europe and between Europe and neighbouring countries. This does not affect the assessment of revenue enabled broadband activity however: the definitions are utilised to consolidate travel to defined categories.

Global	2024	2025	2026	2027	2028
LCC-Dom	$1,742,442,289	$2,233,133,072	$2,740,657,606	$3,008,931,434	$3,678,630,441
FCC-Dom	$1,985,917,304	$2,502,142,770	$3,139,975,403	$3,354,950,116	$3,816,928,170
LCC-Int	$1,087,984,554	$1,298,680,317	$1,573,693,613	$1,778,039,154	$2,148,200,189
FCC-Int	$3,380,976,899	$4,165,932,138	$5,087,091,957	$5,406,768,487	$6,262,013,079
Total	**$8,197,321,046**	**$10,199,888,297**	**$12,541,418,579**	**$13,548,689,190**	**$15,905,771,879**

Table 3: Broadband-enabled airline ancillary revenue by LCCs and FSCs: 2018-2028

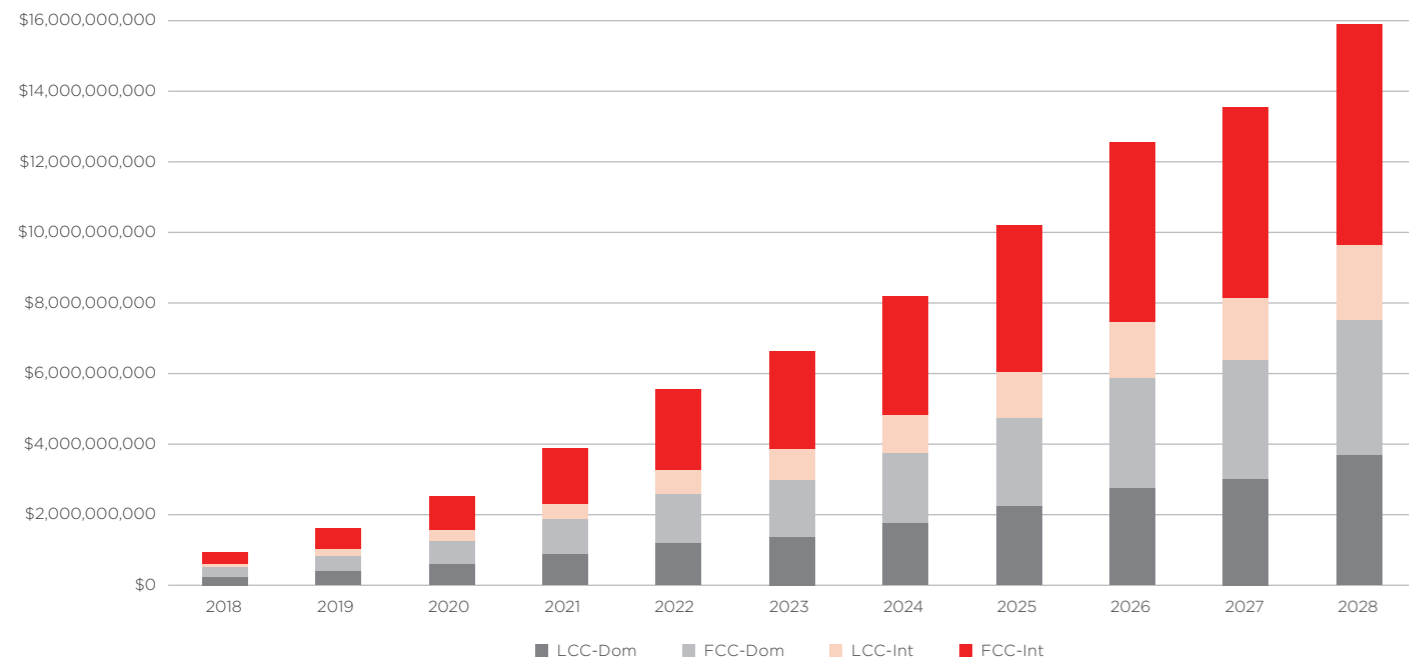Chart 5 depicts the 10-year forecast for these four categories

$16,000,000,000
$14,000,000,000
$12,000,000,000
$10,000,000,000
$8,000,000,000
$6,000,000,000
$4,000,000,000
$2,000,000,000
$0

2018 2019 2020 2021 2022 2023 2024 2025 2026 2027 2028

■ LCC-Dom   ■ FCC-Dom   ■ LCC-Int   ■ FCC-Int

Chart 5: Broadband-enabled airline ancillary revenue by LCCs and FSCs: 2018-2028

The analysis and forecasts provide a number of observations:

• Opportunities exist for both LCCs and FSCs to generate revenue from enhanced cabin broadband;

• FSCs could offer greater opportunity for accelerating some areas due to the larger proportion of business travelers utilising these airlines, including for long haul flights, and premium passengers seeking greater 'luxury' when travelling;

• Premium economy upgrades are also being utilised to attract greater passengers to economy;

• LCCs continue to grow and penetrate traditional FSC markets, but do not represent 'low value' passengers, with the average income of 56% of EU LCCs being €48,000;[56]

• LCCs can generate ancillary broadband enabled revenue from domestic flights in particular, reflecting shorter-haul flights that do not fall into medium-long haul. This is changing as some LCCs begin to embark on long-haul routes with more efficient aircraft such as the 787 Dreamliner and undertake international flights to a greater degree as a result.

Recent industry surveys indicate that 80% of passengers spent an average of $62 on their flight for ancillary services, but would spend almost $100 if this improved their travel experience, including inflight connectivity.[57] Around half of passengers also indicate that they are willing to share personal information in exchange for personalised offers. This reinforces the opportunities quantified for broadband-enabled ancillary revenue in particular, with passenger engagement and registration often a key component of digital engagement and value-added opportunities.

These factors can contribute to strong growth beyond a 10-year forecast. Forecasts to 2035, to the IATA-supplied annual global passenger estimate of 7.2 billion are summarised in Table 4:

| Global	2029	2030	2031	2032	2033	2034	2035
LCC-Dom	$3,998,611,531	$4,404,063,303	$4,824,113,982	$5,410,307,255	$5,853,330,477	$6,295,222,532	$6,729,438,688
FCC-Dom	$4,156,784,308	$4,388,971,625	$4,759,402,486	$5,167,177,928	$5,469,090,701	$5,890,656,579	$6,313,743,881
LCC-Int	$2,431,189,726	$2,741,850,655	$3,025,901,230	$3,371,065,446	$3,711,763,985	$4,036,447,804	$4,369,215,068
FCC-Int	$7,044,472,122	$8,112,943,690	$9,010,651,716	$9,892,203,656	$10,863,464,907	$11,805,464,028	$12,680,100,064
Total	$17,631,057,687	$19,647,829,274	$21,620,069,413	$23,840,754,284	$25,897,650,069	$28,027,790,944	$30,092,497,701

Table 4: Broadband-enabled airline ancillary revenue by LCCs and FSCs: 2029-3035

The opportunity exists for airline revenue to be further maximised if above-average industry revenue sharing can be negotiated: the nature of airline travel offers advertisers a unique opportunity to target a 'captive' audience, along with destination shopping and e-commerce. Primary research indicates that above-average revenue sharing could be achieved due to a number of drivers:

• The captive nature of air passengers;

• The ability to 'replay' key messages to an audience with higher propensity for expenditure in the case of frequent travellers;

• Initiating 'immediate' call-to-action for personalised goods and services or for opportunistic purchases based on destination or preferences;

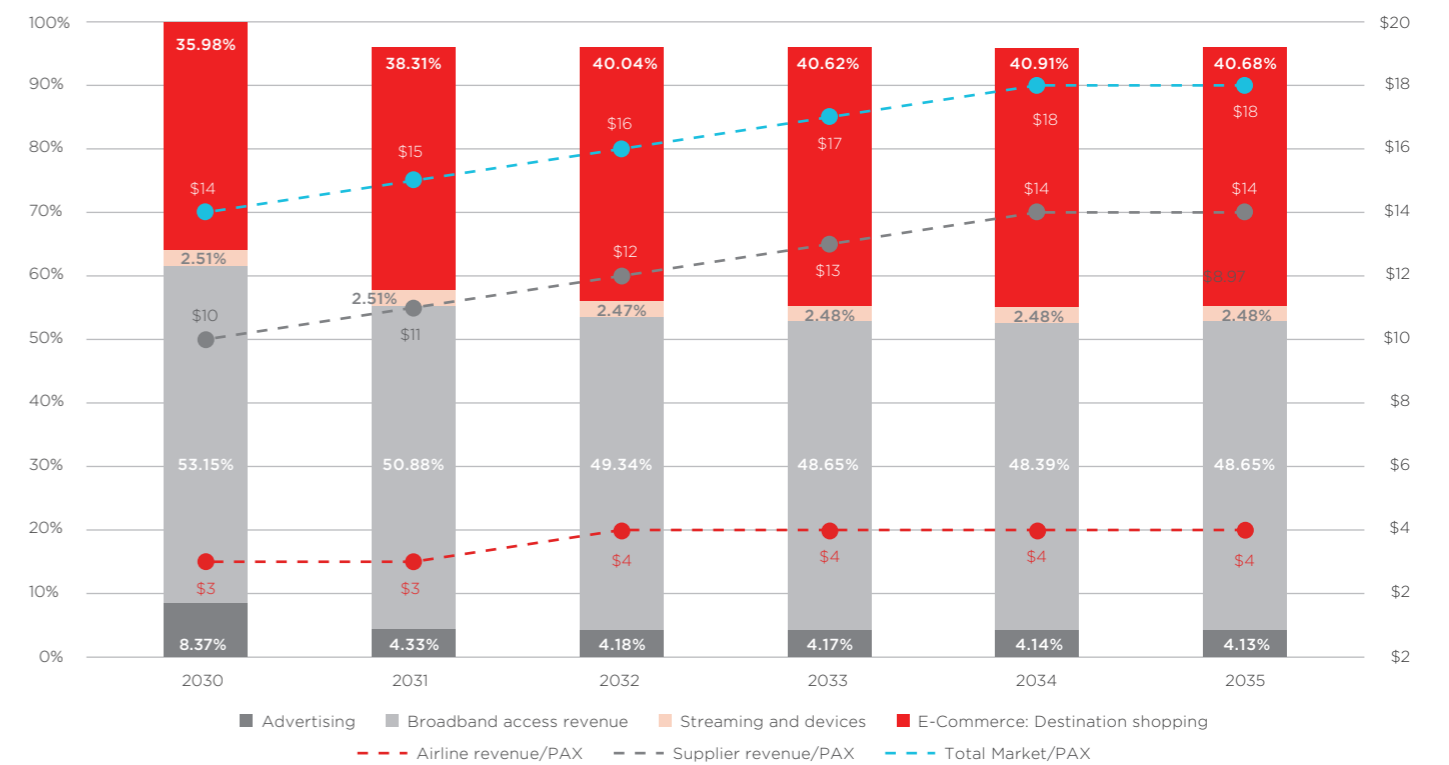• The opportunity to capture additional consumer data in exchange for access to services.

Average Revenue Contribution

The profile for broadband-enabled ancillary services globally is depicted in Chart 6 for the 10-year period between 2018-2028. This depicts a number of average metrics and the migration in the mix of income from broadband access to other areas.
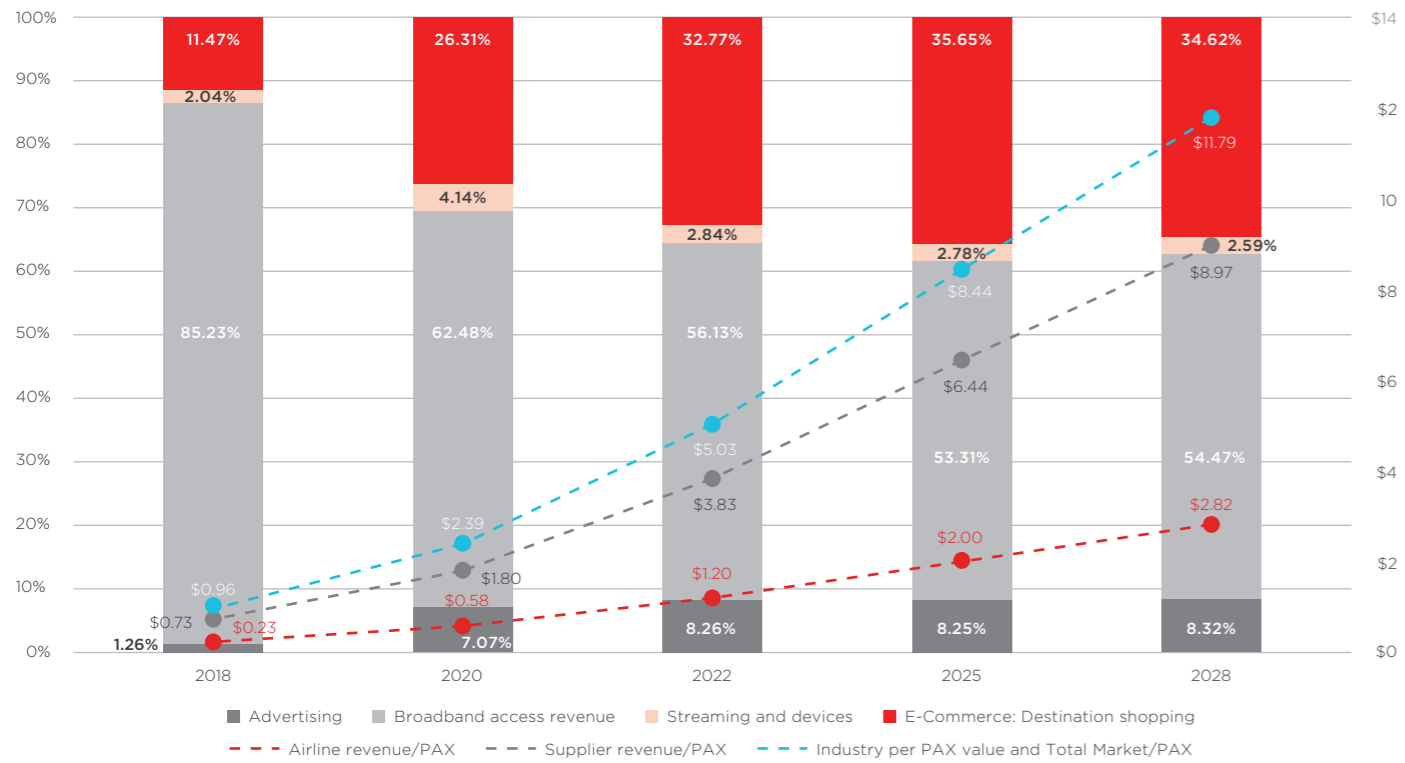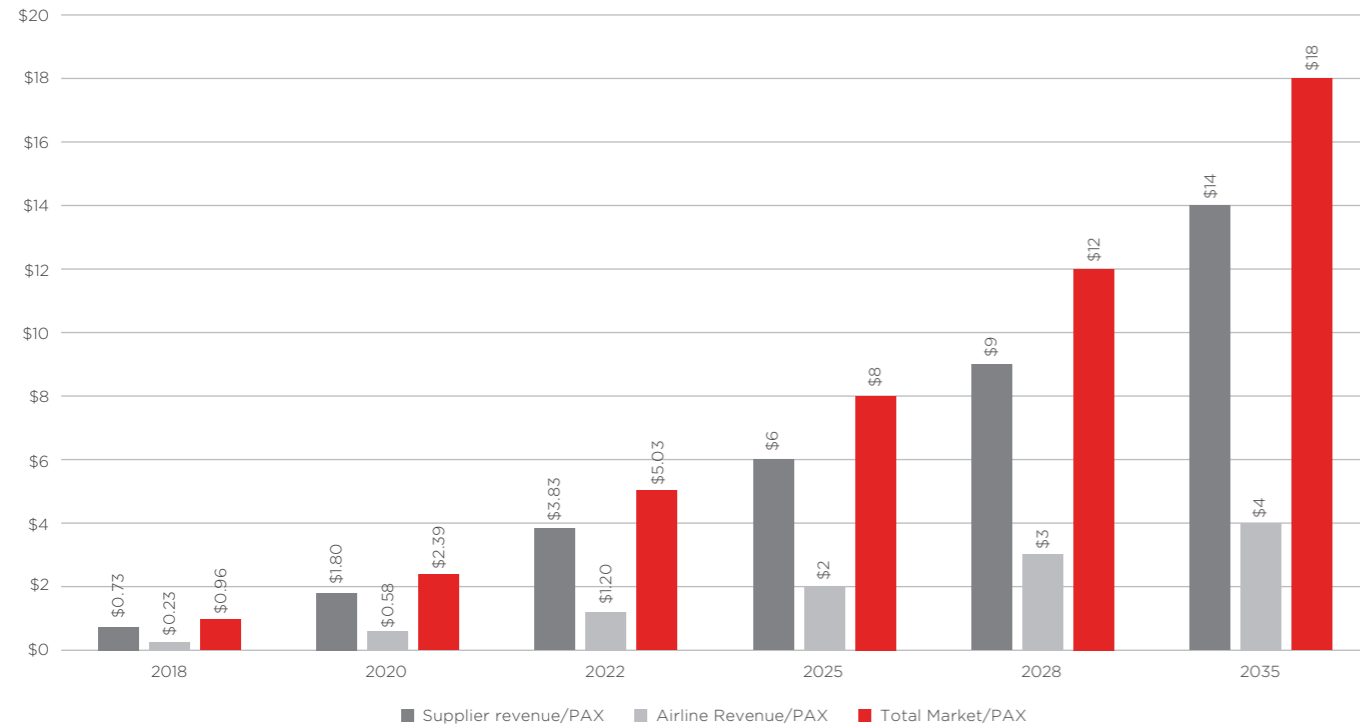

Chart 6: Broadband-enabled ancillary revenue by service and average per passenger revenue: 2018-2028

Chart 7: Broadband-enabled ancillary revenue by service and average per passenger: 2030-2035

The average revenue per passenger for broadband-enabled ancillary services is $0.96 in 2018, comprised of $0.73 for suppliers and $0.23 for airlines. By 2028, revenue from broadband access is forecast to reduce to 54% of the total market revenue, whilst e-commerce revenue is forecast to triple from 11% of total revenue in 2018 to 34% by 2028. Advertising-generated revenue is forecast to reach 8% of total revenue, with premium content forecast to reach 2.5% of total revenue by 2028. Average airline revenue per passenger is forecast to increase by 1,060% to $2.67 by 2028. The contribution from each segment is forecast to level off after 2030, with broadband access revenue flattening at 53% of total revenue and e-commerce at around 40% of the total revenue. Chart 7 depicts growth over 2030-2035.

The average airline revenue per passenger is forecast to continue rising to around $4 until 2033 and remaining at this figure thereafter. This revenue is forecast to generate an average of around $14 per passenger for airline partners engaged in the delivery of broadband-enabled products and services, yielding a total average per passenger of $18 by 2035, depicted in Chart 8.

Chart 8: Total ancillary revenue with broadband enabled ancillary revenue growth

Connectivity-enabled ancillary revenue can be complementary to current ancillary revenue, with the majority of this derived from non-broadband sources such as onboard duty free goods, and accommodation and travel related sales.

Broadband-Enabled Ancillary Revenue

"The airline industry is rapidly evolving to become retail-focused and airlines will have to reinvent themselves as retailers. Airlines could learn a lot from retail chains like WalMart and Tesco, especially when it comes to offering the right product to the right customer at the right time."

A. Brogan, CEO, Datalex

The opportunities offered by a broadband-enabled cabin that meets passenger expectations with respect to bandwidth, quality, and reliability can be significant across both LCCs and FSCs. Of the four segments reviewed, broadband access revenue is forecast to be the dominant ancillary revenue category. This is likely to reduce to a degree over time as a proportion of the total market as other services such as advertising, e-commerce, and premium content increase. The revenue that can be generated across all categories will depend on a number of factors:

• Bargaining power with suppliers, particularly for advertisement revenue sharing and per-ad fees/page impression fees;

• Strategic relationships with major global brands that can provide content;

• Margins obtained from the sale of any goods by the airline from negotiated terms with suppliers;

• The routes flown, with some pairs or destinations offering greater potential for some types of ancillary services enabled by broadband;

• The composition of the passenger base including low cost versus full service; business versus leisure;[58] short haul versus medium or long haul and other factors;

• The carrier's strategy: some carriers may outsource all broadband ancillary revenue opportunities and derive a lower commission whilst others may engage deeper to enhance their operations and margins in the process.

E-commerce and destination shopping represent one of the most significant areas of potential growth that could exceed the estimates in this paper, due to their under-developed status and the greatest possibility to be impacted by high quality cabin connectivity. Although this forecast trails broadband revenue and advertising, it has the potential to exceed estimates due to scale and value of the purchase opportunities. The degree to which this occurs depends on the ability of the airlines to develop shopping, suppliers and other services that passengers can purchase. Primary research has highlighted that close engagement between an airline and the participants in the broadband-enabled ancillary revenue ecosystem is a key success factor. The revenue opportunity areas are summarised in a 10-year revenue window to 2028, and a 20-year window to 2035, aligning with an IATA end-of-period date for passenger forecasts.

Regional Segmentation

"Passenger connectivity in aircraft is transforming the aviation industry. Fast, consistent and reliable broadband for passengers is now a reality and, in our always-connected culture, this service is now a necessity rather than a luxury. In the longer term, the connectivity revolution will change the on board retail offering. Nimbler technology and faster broadband connectivity means that advertisers can offer richer online shopping experiences that could see us say goodbye to the traditional inflight trolley."

M. Franci, SVP, European Sales & Revenue and Inflight Services, Inmarsat Aviation

Consolidated

The regions assessed vary in the forecast take-up of broadband-enabled ancillary revenue. Primary and secondary research has assessed socio-economic factors that can influence consumer behaviour including within demographic segments. Recent primary global research into travel preferences and travel purchase behaviour by business travellers has been utilised to forecast take-up of broadband-enabled ancillary revenue and influencing factors between LCC and FSC carriers.[59] Table 5 presents the consolidated forecasts for airlines for the categories assessed by region.

	2018	2019	2020	2021	2022	2023	2024	2025	2026
Africa Airline Revenue	$10,307,553	$14,244,785	$23,892,349	$42,770,148	$54,649,746	$80,347,679	$91,359,940	$129,884,935	$187,944,773
Asia Pac Airline Revenue	$227,383,313	$485,059,642	$830,910,974	$1,343,974,757	$1,771,317,428	$2,107,533,460	$2,515,440,714	$3,252,709,772	$3,965,567,437
M East Airline Revenue	$37,462,296	$87,462,034	$141,341,623	$227,119,856	$274,621,587	$318,308,283	$407,385,408	$471,169,515	$563,955,018
Europe Airline Revenue	$282,607,006	$454,176,377	$657,611,021	$1,003,106,107	$1,519,398,664	$1,852,912,116	$2,354,130,160	$2,875,600,614	$3,574,779,184
N America Airline Revenue	$318,801,646	$461,988,019	$689,732,181	$1,007,407,643	$1,560,470,626	$1,842,923,796	$2,273,870,595	$2,797,957,414	$3,445,571,766
L America Airline Revenue	$48,956,341	$103,734,034	$173,632,778	$267,343,467	$369,476,878	$417,598,669	$563,643,423	$684,206,187	$816,479,429
Total	$925,518,156	$1,606,664,891	$2,517,120,926	$3,891,721,978	$5,549,934,929	$6,619,624,004	$8,205,830,239	$10,211,528,436	$12,554,297,607

	2027	2028	2029	2030	2031	2032	2033	2034	2035
Africa Airline Revenue	$230,438,993	$306,483,893	$339,947,776	$374,043,981	$414,065,199	$446,363,660	$489,812,022	$513,969,181	$587,805,230
Asia Pac Airline Revenue	$4,329,215,138	$5,083,823,009	$5,678,629,108	$6,385,478,335	$7,235,274,135	$8,204,484,308	$8,928,233,340	$9,794,100,677	$10,329,005,547
M East Airline Revenue	$605,934,252	$685,731,986	$746,932,074	$830,830,189	$916,436,784	$981,076,204	$1,080,247,543	$1,172,326,836	$1,328,636,445
Europe Airline Revenue	$3,828,697,194	$4,479,584,126	$4,927,952,475	$5,462,628,693	$5,881,795,887	$6,417,835,495	$6,923,467,313	$7,461,207,815	$8,230,514,205
N America Airline Revenue	$3,681,206,063	$4,323,464,404	$4,781,827,518	$5,315,577,607	$5,772,942,432	$6,237,204,062	$6,775,168,499	$7,250,359,743	$7,646,409,602
L America Airline Revenue	$885,219,488	$1,022,821,828	$1,148,946,096	$1,272,849,482	$1,392,161,954	$1,546,998,487	$1,692,831,693	$1,828,892,329	$1,959,709,824
Total	$13,560,711,128	$15,901,909,247	$17,624,235,048	$19,641,408,287	$21,612,676,391	$23,833,962,216	$25,889,760,411	$28,020,856,582	$30,082,080,853

Table 5: Consolidated airline revenue by region

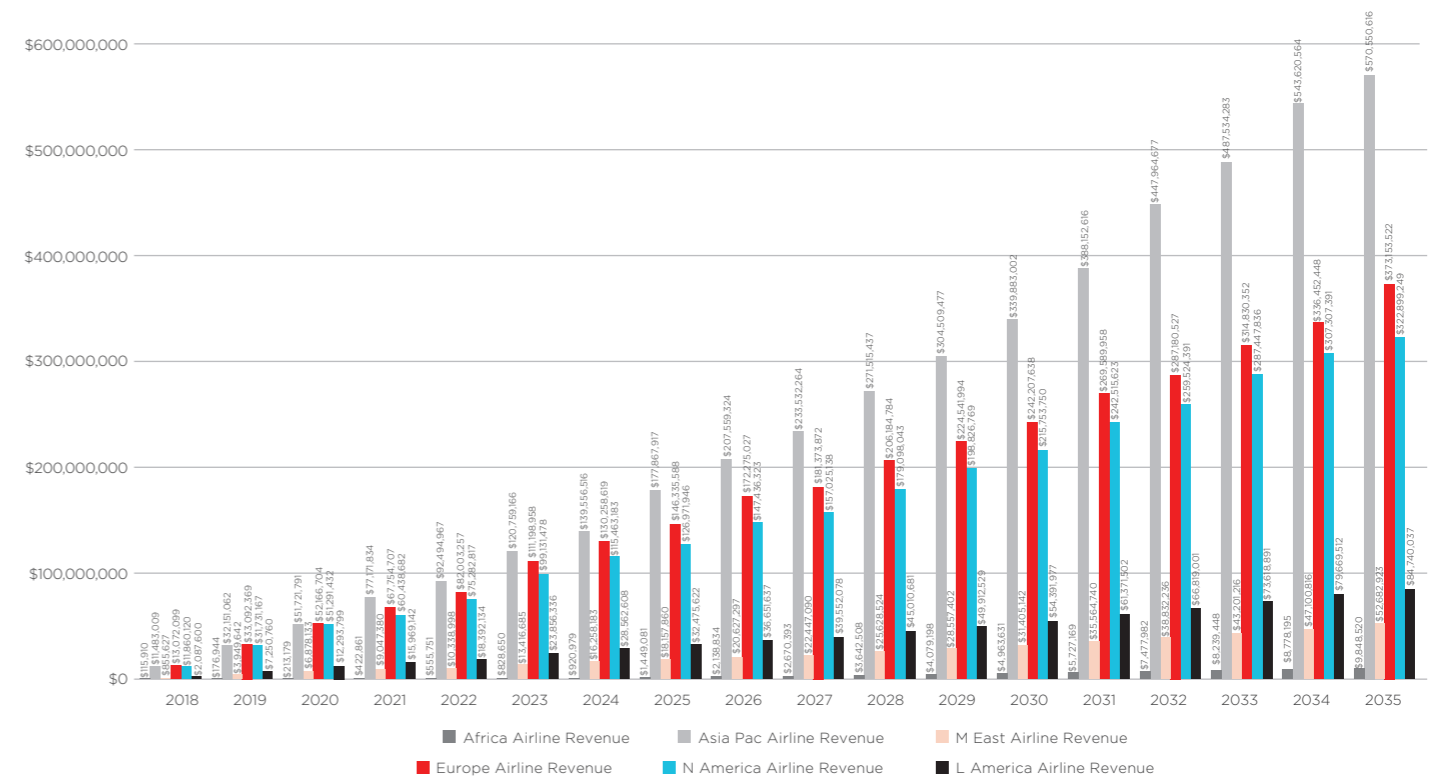Chart 9 depicts the forecasts illustrating the growth in the take-up of services to 2035.

Chart 9: Consolidated airline revenue by region: 2018-2035

Asia Pacific accounts for the largest market by 2035, with IATA estimating the Region to account for over 3 billion passengers annually. This is followed by Europe, North America, Latin America, the Middle East, and Africa.

All regions display a relatively similar distribution of revenue between the broadband-enabled ancillary categories of advertising, broadband access, premium content and e-commerce with the exception of Africa. This region is forecast to develop slower than other regions for non-broadband access revenue and to lag in these areas, reflecting socioeconomic factors that influence disposable income and the supply of services and content. Chart 10 depicts the distribution of airline broadband-enabled forecast revenue for each region in 2028.
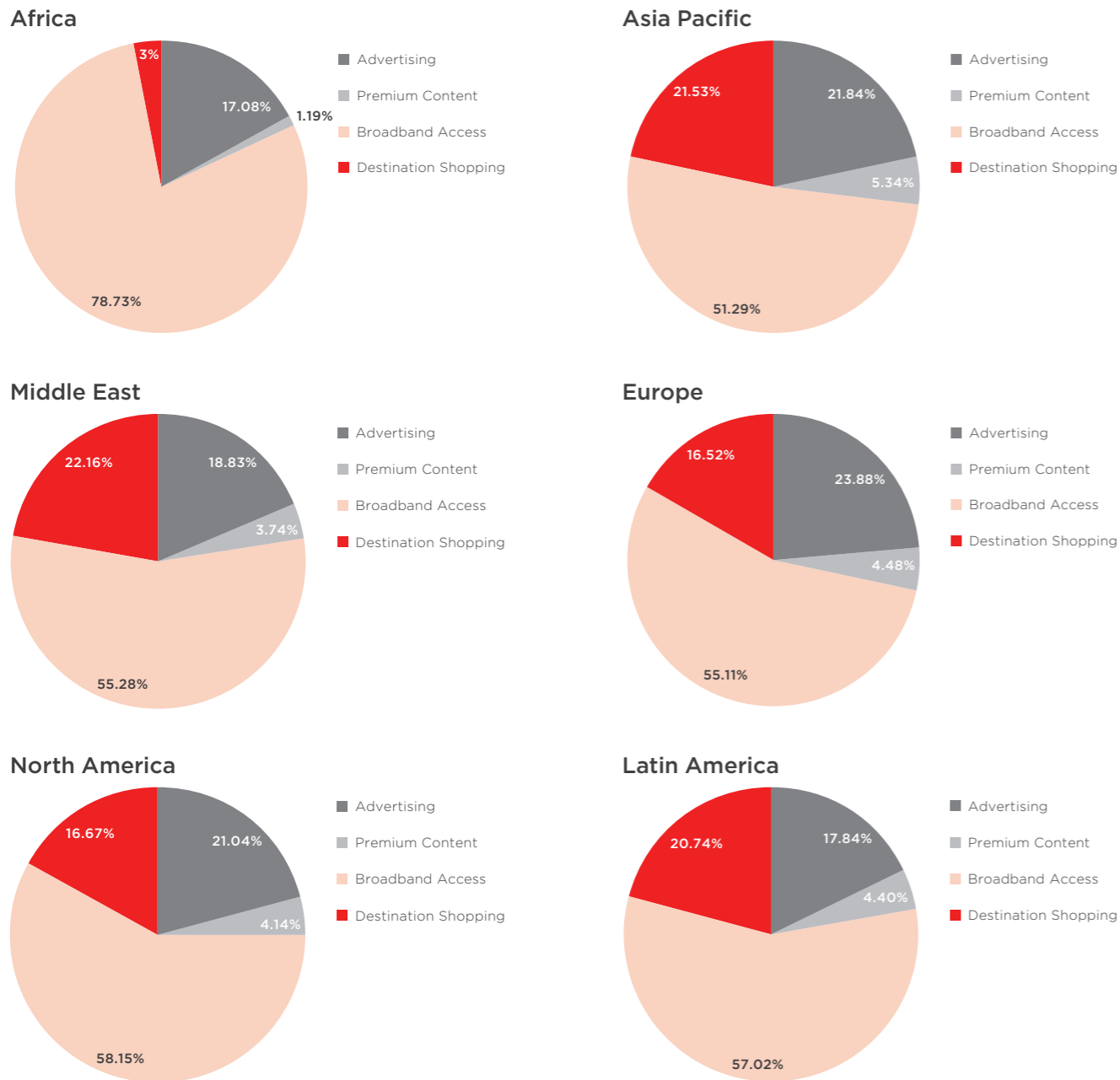
Africa

- Advertising
- Premium Content
- Broadband Access
- Destination Shopping

3%
17.08%
1.19%
78.73%

Asia Pacific

- Advertising
- Premium Content
- Broadband Access
- Destination Shopping

21.53%
21.84%
5.34%
51.29%

Middle East

- Advertising
- Premium Content
- Broadband Access
- Destination Shopping

22.16%
18.83%
3.74%
55.28%

Europe

- Advertising
- Premium Content
- Broadband Access
- Destination Shopping

16.52%
23.88%
4.48%
55.11%

North America

- Advertising
- Premium Content
- Broadband Access
- Destination Shopping

16.67%
21.04%
4.14%
58.15%

Latin America

- Advertising
- Premium Content
- Broadband Access
- Destination Shopping

20.74%
17.84%
4.40%
57.02%

Chart 10: Forecast airline revenue distributed by category by region: 2028

By 2035, these distributions are forecast to alter marginally, primarily in broadband access and e-commerce revenue. In all regions, broadband access is forecast to reduce further by 2035 in a range of 3-6% depending on the region, whilst e-commerce is forecast to increase by 2-6% depending on the region.

Full Service Carriers and Low Cost Carriers

FSCs account for over two thirds of total forecast broadband-enabled airline revenue in 2035, reflecting their approximate average penetration of the market, as depicted in Chart 11.
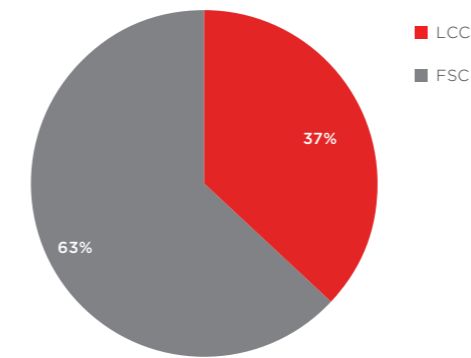

- LCC
- FSC

37%
63%

Chart 11: Segmentation between FSC and LCC forecast revenue for total airline revenue by 2035

The contribution of revenue by each carrier is relatively consistent with the penetration of each in the regions assessed. For LCCs, this varies from 25% to over 50% in 2018, with market estimates obtained and industry consultation occurring to estimate growth to 2035. Forecast LCC revenue is lower than forecast FSC revenue: $11 billion (37%) versus $19 billion (63%) respectively, with this broadly aligned with the respective carrier type market penetration. In some markets, such as Europe, LCC penetration varies significantly, with an average of around 40%.[60] This includes some Nordic countries that have a lower penetration of 5-20%; larger countries such as Germany that have a penetration of 25-30%, and more developed countries such as the UK, Italy and Spain that have a penetration of 45-50%.[61] The penetration of LCCs in the European market has primarily been driven by leisure demand and population growth.[62] Seats on routes within Europe represent 85% of the total number of seats operated from Europe, with LCCs accounting for 39% of the scheduled seats on intra-European routes,[63] and 30% in the US.[64] The low-fare business model has driven growth in LCCs, reflected by over one-third of European and North American air travel occurring on small routes with less than 100,000 passengers annually, and well serviced by LCCs.[65] In contrast, larger routes (with more than one million passengers annually), represent only 14% of air travel in Europe and North America, versus 40% in Asia and 42% in the South West Pacific.[66] These and other market characteristics contribute to lower broadband ancillary revenue forecast for LCCs including:

- **Flight duration:** longer flight segments can result in higher revenue generation from a number of activities such as broadband access, advertising, premium content and some e-commerce activities. This is driven by: longer periods for browsing online with greater advertising ensuing; longer opportunities for premium content to be consumed such as multiple events or a greater number of shows being watched; some destination shopping and to-the-home ordering being greater due to longer browsing periods and the nature of some medium to long haul destinations and family holidays to these. FSCs dominate long haul routes and some medium-long haul routes, skewing revenue from broadband enabled ancillary services to this carrier type vs LCCs.

- **Passenger mix:** primary research and carrier data confirms that FSC's carry a greater proportion of business passengers on all ticket types than leisure passengers.[67] LCCs carry a greater number of leisure passengers, with business passengers less than 30% of total passengers on average for LCCs.[68] Leisure passengers, and in particular holidaying passengers, often have a propensity to:[69] (i) utilise free broadband more than business passengers and some other leisure passengers; (ii) consume less premium content than these passenger types.

This research indicates that the potential for broadband enabled ancillary revenue is high for both LCCs and FSCs, with the mix of revenue types varying between passenger types but increasingly blurring. The current variation in the forecast revenue between the two carrier types reflects both their market penetration and the characteristics of their passenger mix.

> "Travelling for work is something I do pretty regularly, so in recent years the ability to use the internet in the sky has become an added bonus. When it's not there, I definitely notice it. Being connected just makes things easier. I don't need to worry about missing an email or accessing a document. I can let my family know what I'm up to and it makes the whole process much better."

Business Traveller

Africa

Forecast broadband-enabled revenue for Africa shows a stronger growth for domestic LCCs and FSCs, reflecting the greater emphasis on travel within Africa. Growth is lower amongst international LCCs, reflecting their lower predominance, but higher amongst FSCs internationally as the market develops over time. The total airline market is forecast to be worth $306 million by 10-years to 2028 as depicted in Chart 12.
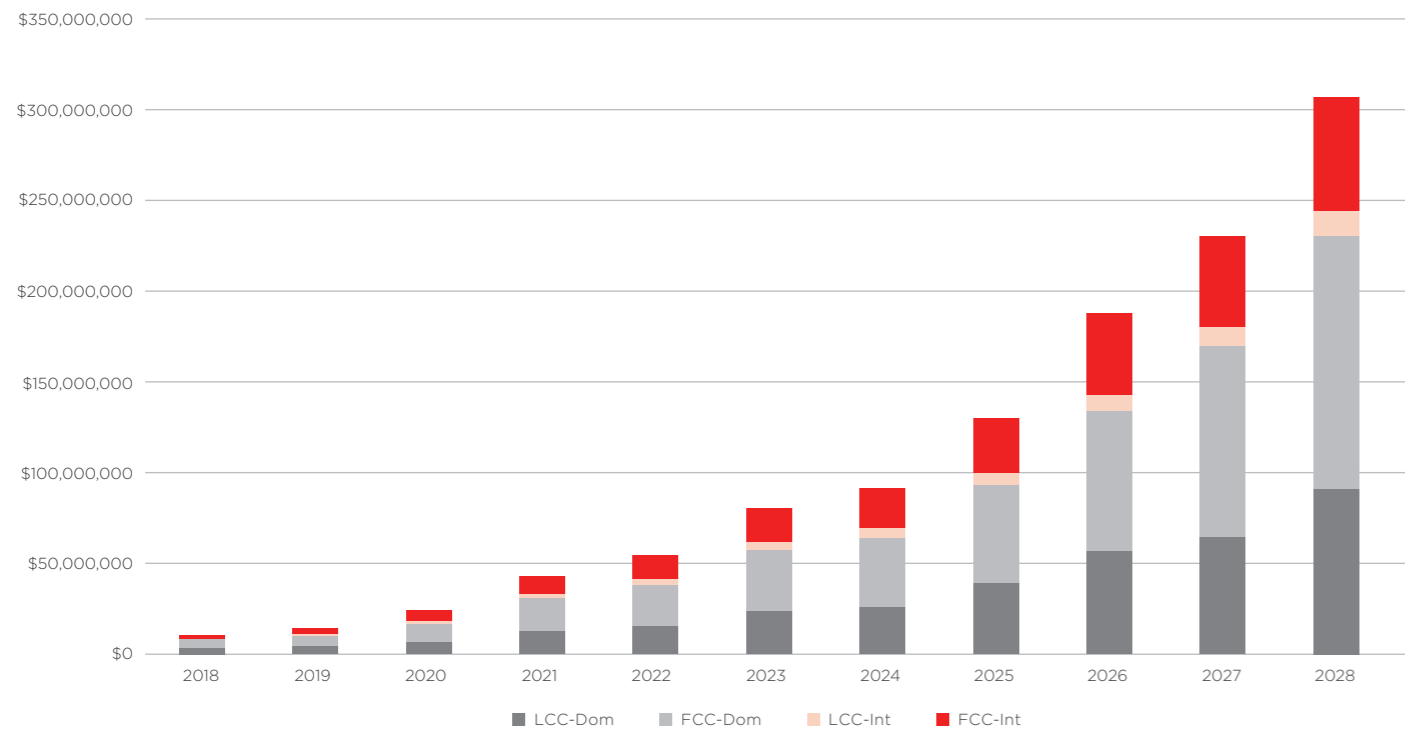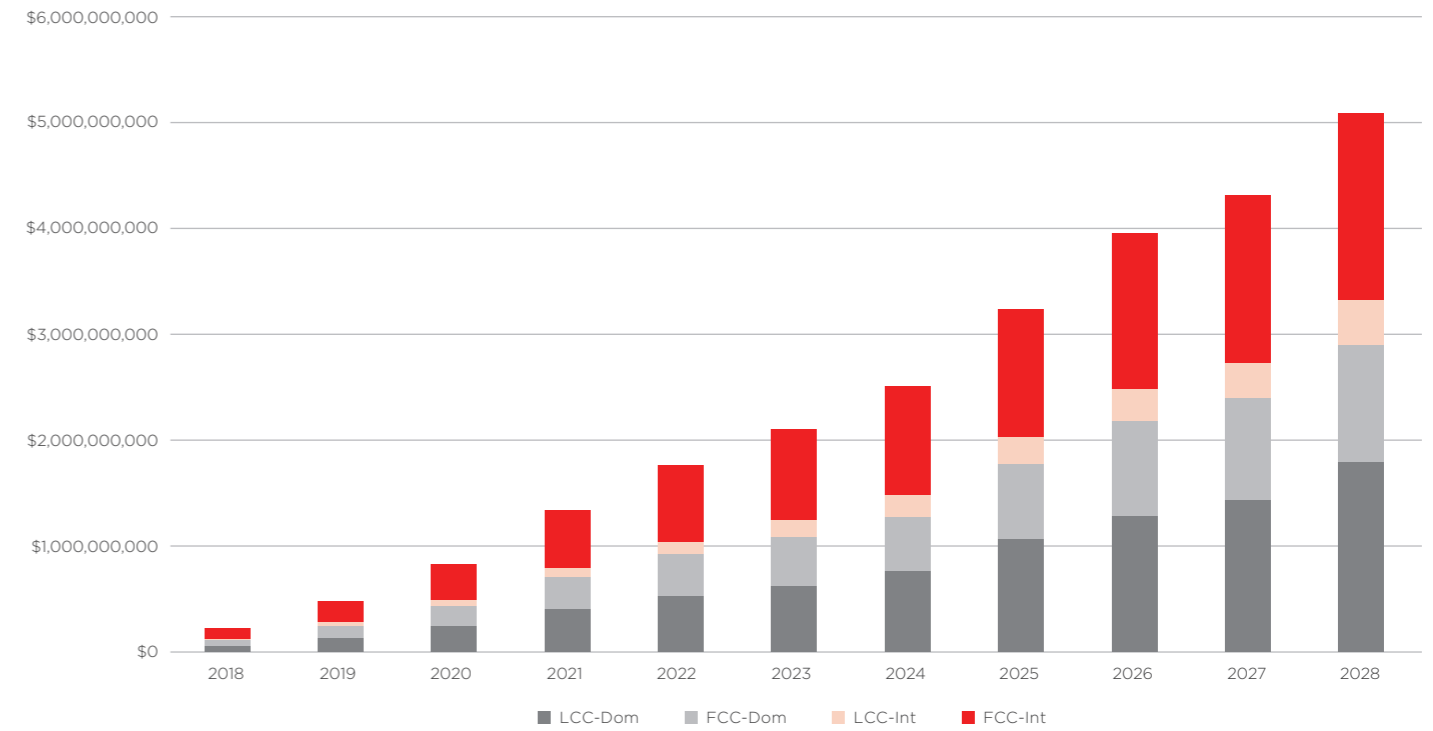

	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028
LCC-DOM	$3,400,094	$3,979,950	$6,539,465	$12,254,722	$15,222,812	$23,274,502	$25,735,367	$39,081,129	$56,704,050	$64,093,767	$91,012,971
FSC-DOM	$4,710,381	$6,028,590	$10,177,110	$18,712,958	$22,840,255	$33,996,833	$38,146,039	$53,988,644	$76,958,000	$105,452,310	$139,040,792
LCC-INT	$407,633	$879,040	$1,404,810	$1,935,713	$3,062,605	$4,508,044	$5,381,704	$6,754,559	$9,314,957	$10,438,310	$14,165,294
FSC-INT	$1,796,167	$3,370,017	$5,785,552	$9,886,367	$13,549,483	$18,599,737	$22,132,003	$30,103,903	$45,036,366	$50,540,587	$62,386,669
Total	$10,314,275	$14,257,597	$23,906,937	$42,789,761	$54,675,155	$80,379,115	$91,395,112	$129,928,236	$188,013,373	$230,524,975	$306,605,726

Chart 12: Total airline broadband enabled ancillary revenue for Africa by LCC and FSC vs. domestic and international travel

Asia Pacific

Asia Pacific broadband-enabled forecasts contrast African forecasts in both scale and the composition of LCC and FSC segments. Airline revenue is forecast to be over $5 billion for the region by 2028, with a more even distribution of revenue estimated between LCC and FSC categories. A number of international LCCs are emerging from this region, reflecting forecast ancillary revenue from cabin activities driven by connectivity as a result, as depicted in Chart 13.
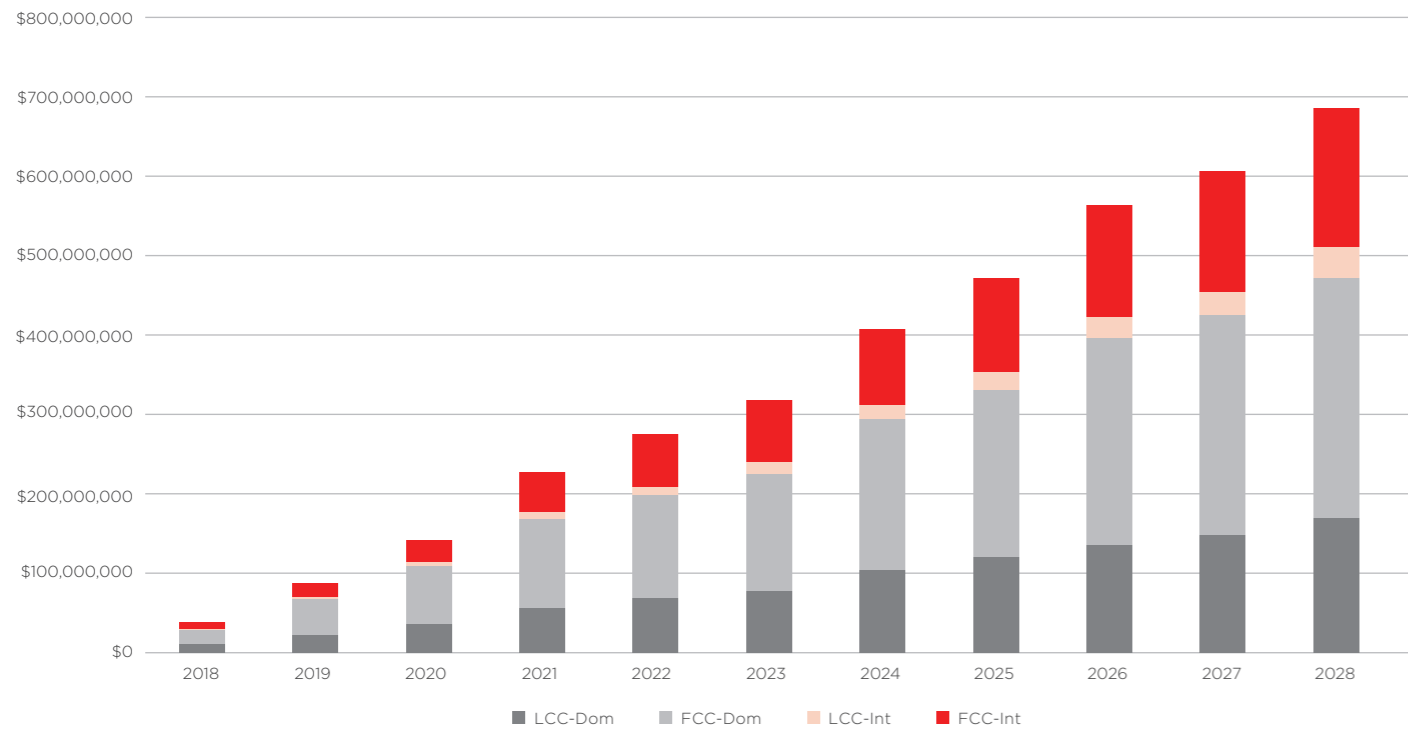

	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028
LCC-DOM	$54,811,786	$130,157,874	$237,184,076	$401,684,657	$528,491,266	$621,518,049	$758,759,187	$1,066,304,006	$1,277,314,732	$1,433,173,058	$1,792,042,130
FSC-DOM	$54,426,867	$107,755,339	$190,365,993	$301,861,691	$389,961,559	$456,314,123	$512,264,878	$708,428,145	$898,011,262	$958,278,190	$1,108,343,475
LCC-INT	$14,797,777	$39,069,451	$58,240,888	$84,246,161	$122,376,041	$164,388,867	$207,056,873	$249,064,278	$303,996,055	$333,243,441	$423,919,905
FSC-INT	$103,568,372	$206,814,344	$342,527,447	$552,216,148	$723,104,383	$858,894,161	$1,028,815,410	$1,217,229,903	$1,473,297,761	$1,592,412,530	$1,763,258,298
Total	$227,604,802	$483,797,007	$828,318,404	$1,340,008,657	$1,763,933,249	$2,101,115,200	$2,506,896,348	$3,241,026,332	$3,952,619,809	$4,317,107,218	$5,087,563,808

Chart 13: Total airline broadband enabled ancillary revenue for Asia Pacific by LCC and FSC vs. domestic and international travel

Middle East

The Middle East region represents one of the higher revenue opportunities for both domestic and international FSCs, depicting the very strong position of many global FSCs have that are based in this region. This includes many of these airlines offering onboard connectivity and passenger-centric value added services, including free and paid broadband, shopping and other services. Carriers from this and other regions are expected to continue offering both free and paid-for broadband connectivity with 'free' options characterised by restricted bandwidth and download data limits and other criteria.[70] It is expected that this trend will continue. The Middle East is forecast to generate almost $700 million by 2028 for airlines as depicted in Chart 14.
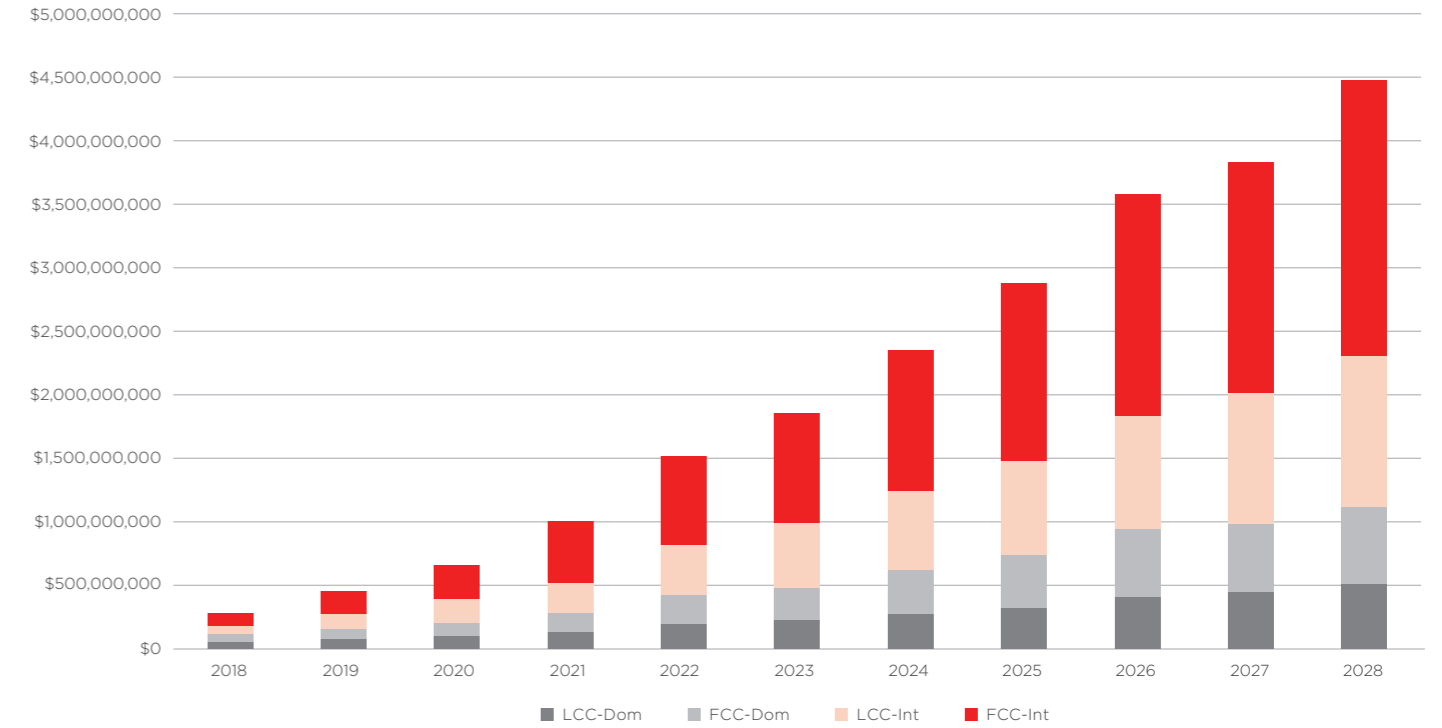

	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028
LCC-DOM	$11,293,006	$22,506,064	$36,469,221	$56,428,831	$68,324,179	$77,014,441	$103,884,003	$120,739,562	$135,567,561	$148,275,454	$169,346,789
FSC-DOM	$17,170,136	$44,306,618	$72,716,762	$111,699,144	$129,339,455	$147,200,570	$189,281,392	$210,099,593	$260,066,331	$276,142,651	$301,495,739
LCC-INT	$1,164,550	$3,317,588	$5,033,811	$7,968,474	$10,836,271	$15,387,760	$18,734,594	$22,412,176	$27,414,440	$30,167,462	$39,503,869
FSC-INT	$7,834,603	$17,331,764	$27,121,828	$51,023,406	$66,121,683	$78,705,512	$95,485,419	$117,918,184	$140,906,686	$151,348,685	$175,385,589
Total	$37,462,296	$87,462,034	$141,341,623	$227,119,856	$274,621,587	$318,308,283	$407,385,408	$471,169,515	$563,955,018	$605,934,252	$685,731,986

Chart 14: Total airline broadband enabled ancillary revenue for the Middle East by LCC and FSC vs. domestic and international travel

Europe

Chart 15 depicts the forecast airline revenue for Europe, which is estimated to reach $4.4 billion by 2028. This region displays a disproportionally high revenue from international FSCs, including medium and long haul flights. Both international FSCs and LCCs show the highest broadband-enabled ancillary revenue potential, with FSCs in particular accounting for around two thirds of the total forecast airline revenue. Around one third is accounted for by international LCCs.
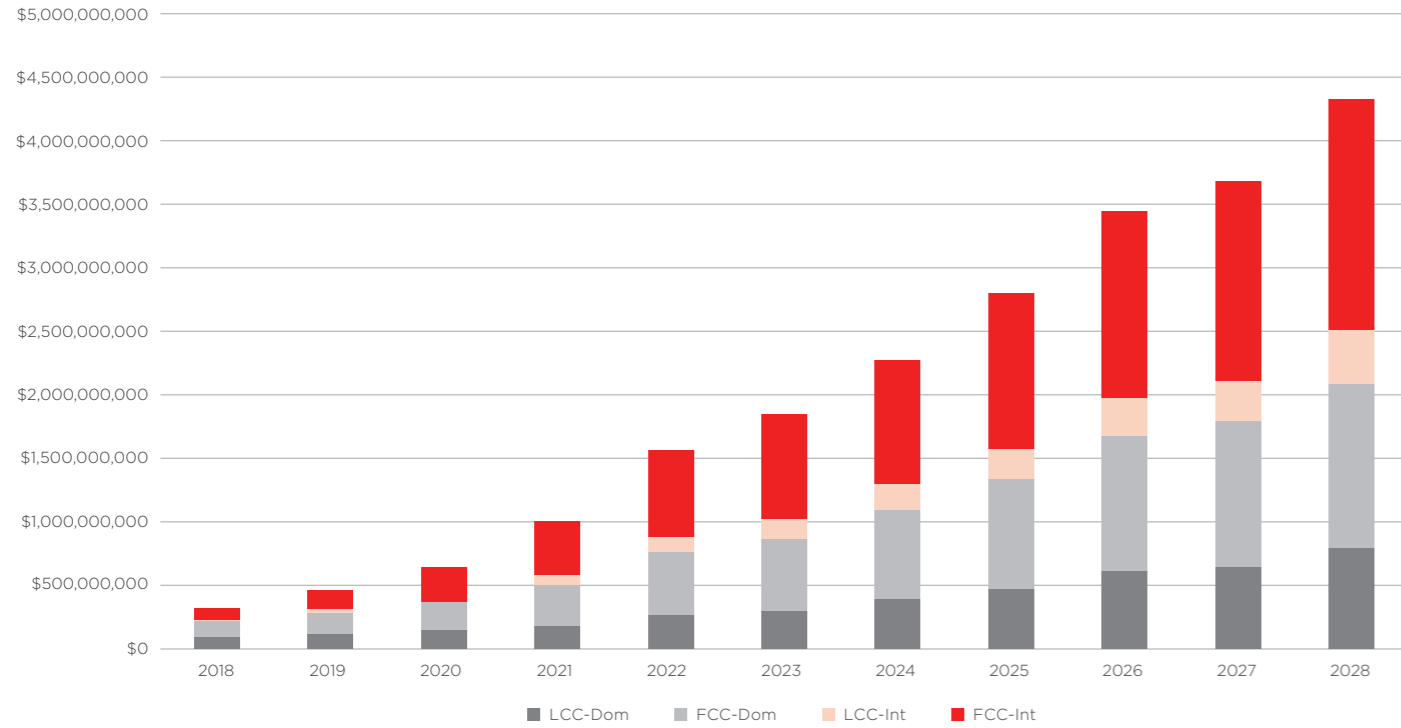

	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028
LCC-DOM	$53,693,285	$75,517,009	$100,746,030	$127,664,402	$191,938,049	$221,021,115	$275,242,865	$319,592,775	$407,641,768	$447,986,587	$509,661,791
FSC-DOM	$56,852,803	$79,602,510	$101,728,057	$149,693,222	$231,075,006	$256,980,119	$342,094,372	$413,945,597	$531,273,361	$529,409,265	$606,281,690
LCC-INT	$64,917,686	$117,961,748	$183,571,300	$242,431,015	$388,819,694	$507,444,472	$627,663,258	$746,521,685	$895,448,578	$1,036,363,497	$1,183,510,955
FSC-INT	$107,143,232	$181,095,109	$271,565,634	$483,317,468	$707,565,914	$867,466,409	$1,109,129,664	$1,395,540,557	$1,740,415,478	$1,814,937,845	$2,180,129,691
Total	$282,607,006	$454,176,377	$657,611,021	$1,003,106,107	$1,519,398,664	$1,852,912,116	$2,354,130,160	$2,875,600,614	$3,574,779,184	$3,828,697,194	$4,479,584,126

Chart 15: Total airline broadband enabled ancillary revenue for Europe by LCC and FSC vs. domestic and international travel

North America

North America displays strong international FSC forecast revenue, accounting for over $4.3 billion estimated broadband-enabled ancillary revenue by 2028. The region also has a strongly developed domestic LCC and FSC market, and over time, a growing international LCC market. Chart 16 depicts the four segments and the move to greater mirroring of the two FSC and the two LCC segments respectively over time.
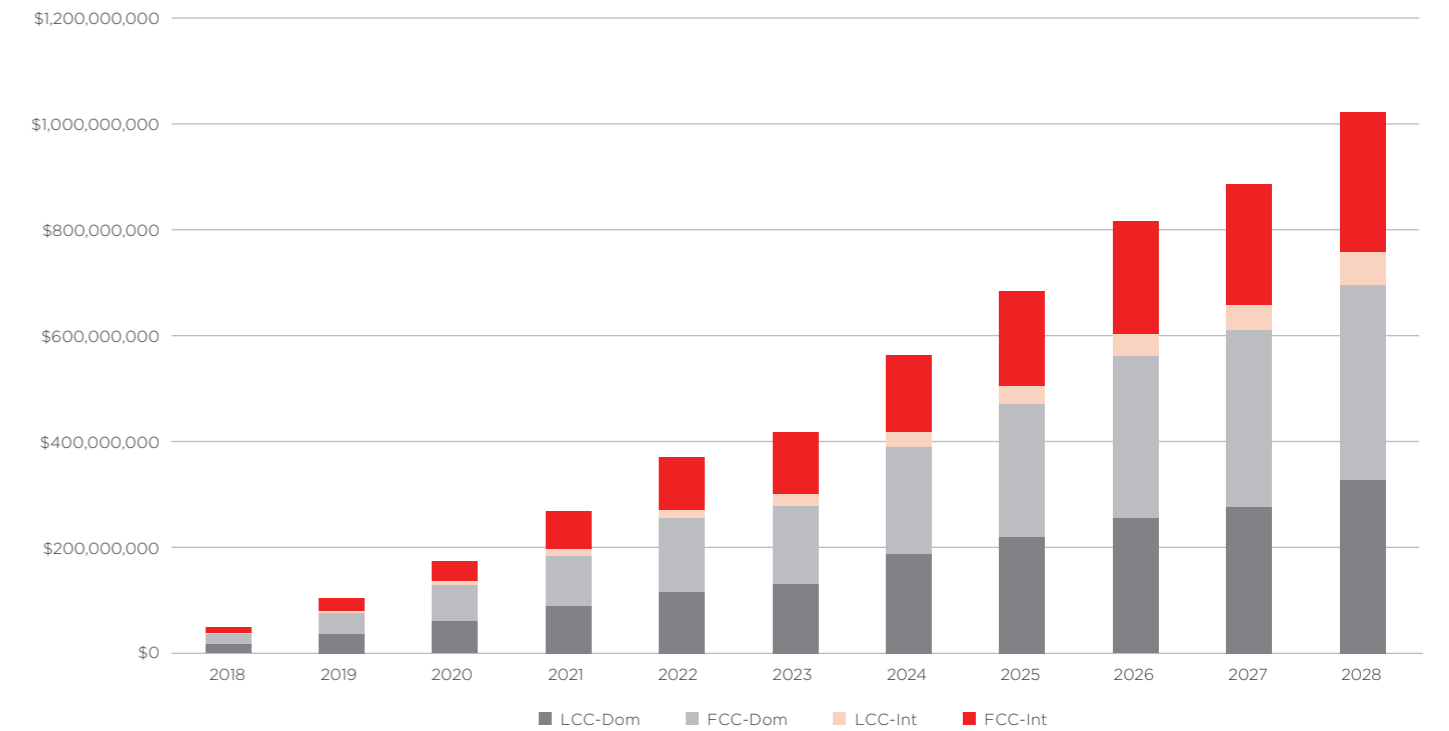

	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028
LCC-DOM	$93,256,115	$111,554,274	$144,019,235	$176,737,507	$262,489,433	$292,635,150	$391,002,891	$467,674,138	$608,466,453	$639,562,328	$789,393,942
FSC-DOM	$122,413,947	$168,377,742	$226,132,064	$327,227,090	$500,435,201	$567,200,017	$702,805,513	$865,903,756	$1,068,448,344	$1,151,054,688	$1,294,266,853
LCC-INT	$11,427,172	$30,815,345	$51,925,936	$71,501,926	$115,442,209	$162,896,346	$199,935,803	$238,960,173	$294,372,187	$320,642,298	$424,324,065
FSC-INT	$91,704,413	$151,240,659	$267,654,947	$431,941,120	$682,103,783	$820,192,284	$980,126,389	$1,225,419,346	$1,474,284,782	$1,569,946,749	$1,815,479,544
Total	$318,801,646	$461,988,019	$689,732,181	$1,007,407,643	$1,560,470,626	$1,842,923,796	$2,273,870,595	$2,797,957,414	$3,445,571,766	$3,681,206,063	$4,323,464,404

Chart 16: Total airline broadband enabled ancillary revenue for North America by LCC and FSC vs. domestic and international travel

Latin America

Latin America is forecast to generate $1 billion in broadband enabled revenue for the airlines by 2028, as depicted in Chart 17. Large internal distances and strong established international routes from FSCs serve to drive the potential distribution of revenue to FSCs, but this is expected to become relatively more equal over time in this market. International LCCs generate a smaller but growing revenue component, reflecting a global trend towards more LCCs entering long-haul flights, facilitated by new generations of more fuel efficient aircraft capable of flying long distances.

	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028
LCC-DOM	$16,000,897	$36,408,811	$60,397,839	$89,582,881	$115,344,761	$131,101,398	$187,817,977	$219,741,461	$254,963,043	$275,840,240	$327,172,818
FSC-DOM	$20,067,323	$38,958,037	$67,910,312	$94,168,525	$138,931,204	$146,203,436	$201,325,110	$249,777,035	$305,218,105	$334,613,012	$367,499,620
LCC-INT	$1,564,631	$4,913,620	$7,385,962	$11,573,438	$16,590,040	$23,275,762	$29,212,322	$34,967,446	$43,147,397	$47,184,146	$62,776,101
FSC-INT	$11,323,490	$23,453,565	$37,938,665	$72,018,624	$98,610,873	$117,018,072	$145,288,013	$179,720,245	$213,150,885	$227,582,090	$265,373,289
Total	$48,956,341	$103,734,034	$173,632,778	$267,343,467	$369,476,878	$417,598,669	$563,643,423	$684,206,187	$816,479,429	$885,219,488	$1,022,821,828

Chart 17: Total airline broadband enabled ancillary revenue for Latin America by LCC and FSC vs. domestic and international travel

Regional Broadband-Enabled Revenue Categories

This section consolidates the forecasts per region for LCCs and FSCs, both for 10-year forecasts to 2028 and to 2035. It provides further background to the categories utilised and displays the forecasts by region for advertising, broadband revenue, premium content and e-commerce and destination Shopping.

Advertising

Consumers are bringing their online expectations to travel environments irrespective of whether this is with an LCC or an FSC. Airlines are currently segmenting their broadband access in many cases to offer free and paid-for access. 'Free broadband' most often entails some restrictions such as throttled speed; data restrictions; advertising (both static and dynamic adverts and video), and other modes that offset the cost of service or can act as a profit centre. Research indicates that user acceptance of mobile advertising can be high, especially when 'trust' is established.[71] The use of add-on advertising is widely accepted by consumers. Advertisers are increasingly shifting to 'relevance' with content that consumers can identify with.[72] This also maximises the call-to-action that can yield additional revenue being generated either through purchasing behaviour or through the clicking of advertisements or content that is presented.

Two potential advertising-driven revenue generation modes have been quantified. These mirror terrestrial online advertising models that consumers are familiar with, and that advertisers and content providers utilise to reach their target markets. The two areas of opportunity assessed encompass: (1) page impressions and click-through-revenue generation applicable to both paid and free-access broadband; and; (2) video/content interrupting advertising applicable to 'free access' broadband (e.g. YouTube and Spotify).

Advertising: Page Impressions and Pay Per Click

This revenue opportunity reflects one of the most mature elements of internet browsing: the use of advertisements positioned on pages with the aim of promoting a click-through. This area is not currently developed to a significant degree today, but the opportunity exists for airlines to generate higher revenue from advertising. This includes a greater degree of airline engagement and investment, such as managing the promotion of adverts on its network of pages that range such as on a portal (landing page) from which the airline can capture and channel registration, through to offering web browsing but with appropriate identification and commercial arrangements to capture page impressions and click-through on adverts by passengers to generate revenue for the airline.

The use of advertising at 35,000 feet poses challenges when using traditional modes of calculating payment rates, including cross-border considerations, any technical elements required to be implemented to enable the clear identification and assignment of revenue and the unique nature of the captive market that has a lower substitutability factor for other activities compared to terrestrial browsing. This could result in airlines offering internet access through their portal after registration by a passenger, as occurs with many free broadband Wi-Fi services in hotels, venues, and other locations. Passenger activity can be tracked and revenue generated through the capturing of calls-to-action including click-through and conversions. In order to define revenue in one of the more difficult areas of activity to quantify at present, due to the infancy of this opportunity, industry averages were utilised where possible and a simplified approach utilised based on payment per click but reflecting the unique nature of the opportunity to personalise content. This included an estimation of the time a passenger could view content based on flight characteristics (duration; browsing times available) and an average pay per click and sharing of revenue with a third party, such as a content provider.

Primary research indicates that the unique nature of a 'contained' passenger audience in the air offers airlines the opportunity to segment and offer multiple services for broadband access. This includes revenue generation from pay per click. The degree to which this can occur is dependent on multiple factors including the engagement of the airline and the development of commercial, technical and other collaborative arrangements with third parties. This encompasses both an 'open access model' for broadband connectivity and lower participation by the airline, and a proactive model of engagement facilitating a wide ecosystem of pay per click including personalised content. The degree to which the identification of the flight and the airline can occur will determine the size of the opportunity available and the rates negotiated. This is expected to be higher than terrestrial browsing, reflecting an 'audience in the sky' that the airline is seeking to monetise for a finite duration. This potential opportunity should be viewed as a starting point with the degree of revenue generation dependent on such factors and others. Table 6 depicts the potential market opportunity for this service:

Advertising – Page Impressions/Pay Per Click

	2018	2019	2020	2021	2022	2023	2024	2025	2026
Africa	$186,904	$2,465,288	$3,663,464	$5,506,004	$10,148,280	$11,269,198	$14,345,020	$18,769,443	$27,407,215
Asia Pac	$6,762,944	$71,852,270	$119,489,827	$176,334,125	$304,200,473	$354,244,241	$478,908,434	$555,899,546	$756,844,727
Middle East	$745,024	$9,672,493	$16,286,321	$22,650,338	$38,234,759	$45,771,485	$62,122,261	$68,995,947	$91,934,177
Europe	$4,511,692	$47,641,353	$83,934,614	$119,664,655	$208,710,411	$253,541,231	$341,129,954	$382,458,614	$515,417,565
N America	$7,751,341	$71,010,194	$126,856,495	$157,410,341	$295,833,644	$344,099,999	$458,948,445	$501,245,621	$670,276,847
L America	$1,376,723	$14,350,762	$23,854,739	$32,840,144	$54,866,062	$65,069,233	$87,752,630	$96,647,122	$127,770,146
Total Market Forecast	$21,334,628	$216,992,359	$374,085,461	$514,405,607	$911,993,629	$1,073,995,387	$1,443,206,744	$1,624,016,293	$2,189,650,676
Total Airline Revenue	**$10,667,314**	**$108,496,179**	**$187,042,730**	**$257,202,803**	**$455,996,814**	**$536,997,693**	**$721,603,372**	**$812,008,146**	**$1,094,825,338**

	2027	2028	2029	2030	2031	2032	2033	2034	2035
Africa	$31,842,683	$34,974,085	$38,979,999	$42,679,866	$48,410,281	$53,080,687	$58,201,669	$63,816,694	$69,342,042
Asia Pac	$835,590,514	$907,613,023	$1,060,428,287	$1,160,497,742	$1,348,427,595	$1,580,635,659	$1,716,792,272	$1,889,017,250	$1,981,280,763
Middle East	$100,182,036	$109,169,779	$126,379,720	$137,720,261	$158,890,397	$173,150,991	$199,162,318	$217,040,385	$232,615,491
Europe	$552,988,695	$592,399,091	$675,584,233	$724,217,403	$823,270,063	$883,076,849	$1,001,430,044	$1,074,472,572	$1,200,634,607
N America	$718,268,257	$769,682,132	$892,126,847	$956,052,141	$1,102,129,963	$1,181,104,171	$1,355,183,654	$1,452,294,161	$1,525,979,220
L America	$138,070,218	$149,200,440	$171,365,964	$185,185,523	$211,970,252	$229,069,951	$261,401,613	$282,467,957	$297,367,930
Total Market Forecast	$2,376,942,404	$2,563,038,551	$2,964,865,051	$3,206,352,936	$3,693,098,551	$4,100,118,309	$4,592,171,569	$4,979,109,020	$5,307,220,053
Total Airline Revenue	**$1,188,471,202**	**$1,281,519,276**	**$1,482,432,526**	**$1,603,176,468**	**$1,846,549,275**	**$2,050,059,154**	**$2,296,085,784**	**$2,489,554,510**	**$2,653,610,027**

Table 6: Broadband-enabled pay per click revenue: 2018-2028

A slower initial take-up has been factored, reflecting feedback from primary research on the period potentially required for this service to become established and to permit the appropriate operational models to be defined. A nominal figure of $10 million has been forecast for airlines in 2018, due to the infancy of this opportunity and the activities required to facilitate its implementation. Revenue has subsequently been forecast to rise to almost $1.3 billion for airlines by 10-years to 2028 and $2.7 billion by 2035, depending on the revenue sharing arrangements implemented, commission rates secured and other factors including differing delivery models. This could take the form of 'sponsorship' on a per passenger basis by an advertiser including by route ('destination'), or on other factors that monetise the value of a more captive audience. The forecast revenue should be viewed as indicative of the potential opportunities inherent in the market, with the ultimate delivery model formative at present. Chart 18 depicts the forecast revenue component for airlines by region to 2035.
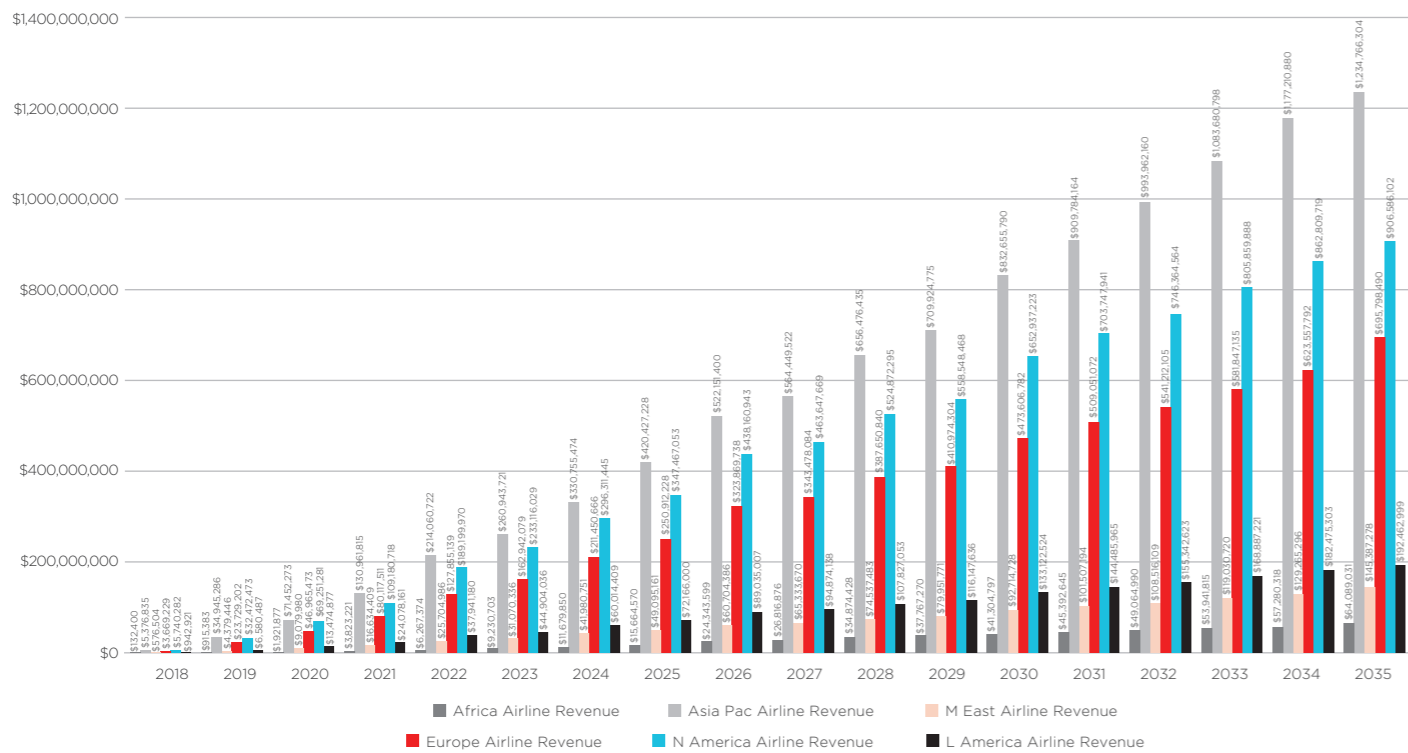

Chart 18: Broadband-enabled ancillary revenue for airlines for pay per click: 2018-2035

Advertising: Ad-Supported Free Broadband Connectivity

The second broadband-enabled source of advertising revenue is widely utilised by leading dynamic content providers of 'free access' such as *YouTube, Spotify and SoundCloud*: interrupted content with advertisements. This can take the form of short or longer videos, audio adverts, static adverts, with more popular content often attracting a higher frequency of interruptions. YouTube is a market leader in the monetisation of its 1.3 billion user base that watches five billion videos per day,[73] through both interrupted and placed adverts. This model bridges a gap between Netflix's subscription ad-free service and the development of a new service offering original shows, supported by adverts. The Company has highlighted a gap in the market for those seeking a subscription-free content experience for original shows.[74] Following primary and secondary research, the model defined for ad-supported free broadband utilises a number of elements drawn directly from leading ad-supported content models:

- Interruption of free broadband access with either video, audio or static adverts;

- The time between interruptions is based on flight duration, with longer flights (medium and long-haul) resulting in longer times between interruptions;

- The type of adverts presented vary and include a mix of audio, video and static modes;

- Adverts can be personalised to individual passengers if they are logged in based on information known about them, or to a segment such as a popular holiday route or a high-frequency city route.

Revenue sharing could potentially occur equally, or even higher for the airline, depending on the commercial terms negotiated.

The potential revenue for this market is summarised in Table 7, with an equal revenue sharing assumed for ads. This yields potential revenue for airlines of around $1.8 billion by 2028.

Advertising- Commercials (for free Connectivity Option)

	2018	2019	2020	2021	2022	2023	2024	2025	2026
Africa	$220,666	$1,525,638	$3,203,128	$6,372,034	$10,445,623	$15,384,505	$19,466,416	$26,107,617	$40,572,666
Asia Pac	$8,963,502	$58,248,835	$119,111,080	$218,320,691	$356,833,837	$434,982,385	$551,361,606	$700,855,574	$870,417,353
Middle East	$960,841	$7,299,077	$15,133,301	$27,724,015	$42,841,644	$51,783,894	$69,967,918	$81,825,268	$101,173,976
Europe	$6,115,382	$39,548,669	$78,275,789	$133,529,186	$213,091,898	$271,570,132	$352,417,776	$418,187,046	$539,782,896
N America	$9,567,137	$54,120,789	$115,418,801	$181,967,863	$315,333,284	$388,526,715	$493,852,408	$579,111,755	$730,268,239
L America	$1,571,535	$10,967,478	$22,458,129	$40,130,269	$63,235,300	$74,840,060	$100,024,015	$120,276,666	$148,391,678
Total Market Forecast	$27,399,063	$171,710,486	$353,600,228	$608,044,059	$1,001,781,585	$1,237,087,691	$1,587,090,140	$1,926,363,927	$2,430,606,807
Total Airline Revenue	$16,438,171	$103,022,277	$212,145,762	$364,795,835	$601,029,370	$742,206,904	$952,192,595	$1,155,732,239	$1,458,265,073

	2027	2028	2029	2030	2031	2032	2033	2034	2035
Africa	$44,694,794	$58,124,046	$62,945,450	$68,841,328	$75,654,408	$81,774,983	$89,903,025	$95,467,196	$106,815,052
Asia Pac	$940,922,026	$1,094,378,041	$1,183,480,600	$1,388,066,098	$1,516,640,272	$1,656,989,569	$1,806,554,491	$1,962,502,465	$2,058,452,631
Middle East	$108,889,450	$124,229,138	$133,252,952	$154,524,546	$169,178,657	$180,860,182	$198,384,534	$215,442,161	$242,312,129
Europe	$572,463,473	$646,084,733	$684,957,173	$789,344,636	$848,418,454	$902,020,174	$969,745,225	$1,039,262,987	$1,159,664,151
N America	$772,746,115	$874,787,158	$930,914,113	$1,088,228,705	$1,172,913,235	$1,243,940,940	$1,343,099,813	$1,438,016,198	$1,510,976,836
L America	$158,123,564	$179,711,755	$193,579,393	$221,870,874	$240,809,942	$258,904,372	$281,478,701	$304,125,504	$320,771,665
Total Market Forecast	$2,597,839,422	$2,977,314,871	$3,189,129,681	$3,710,876,187	$4,023,614,968	$4,324,490,220	$4,689,165,789	$5,054,816,512	$5,398,992,465
Total Airline Revenue	$1,558,599,960	$1,786,238,533	$1,913,314,224	$2,226,341,844	$2,413,968,981	$2,594,462,551	$2,813,247,577	$3,032,599,308	$3,239,090,204

Table 7: Broadband-enabled ancillary revenue for ad-supported free broadband connectivity

The market potential for this segment displays the highest potential for commercialisation, with industry discussions highlighting a number of factors for the accelerated take-up of the services commencing from a lower base. By 2035, this market could generate around $3.2 billion in revenue, for airlines. This utilises current advertisement costs drawn from a representative group of online global brands that utilise interrupted advertising; revenue sharing data; passenger demand forecasts and other factors.
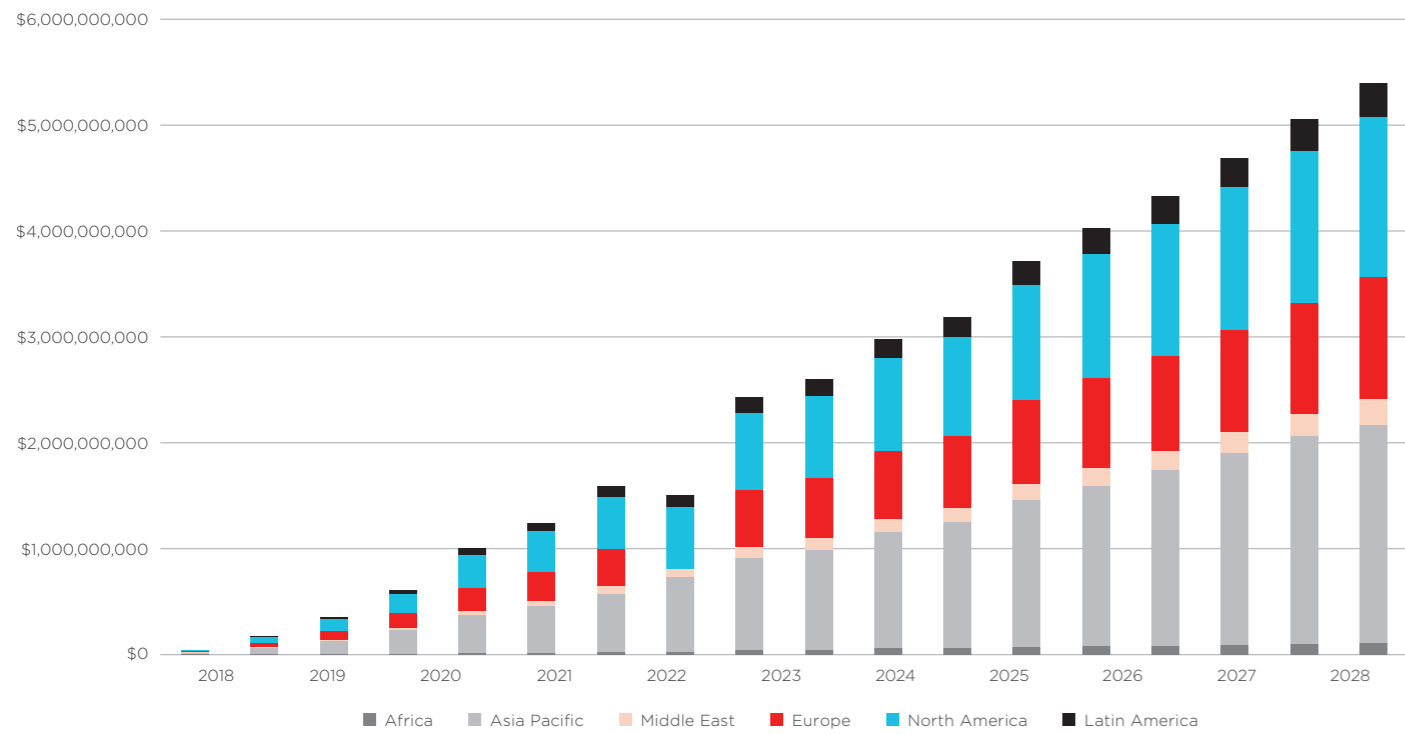

Chart 19: Broadband-enabled ancillary revenue for ad-supported free broadband connectivity: 2018-2035
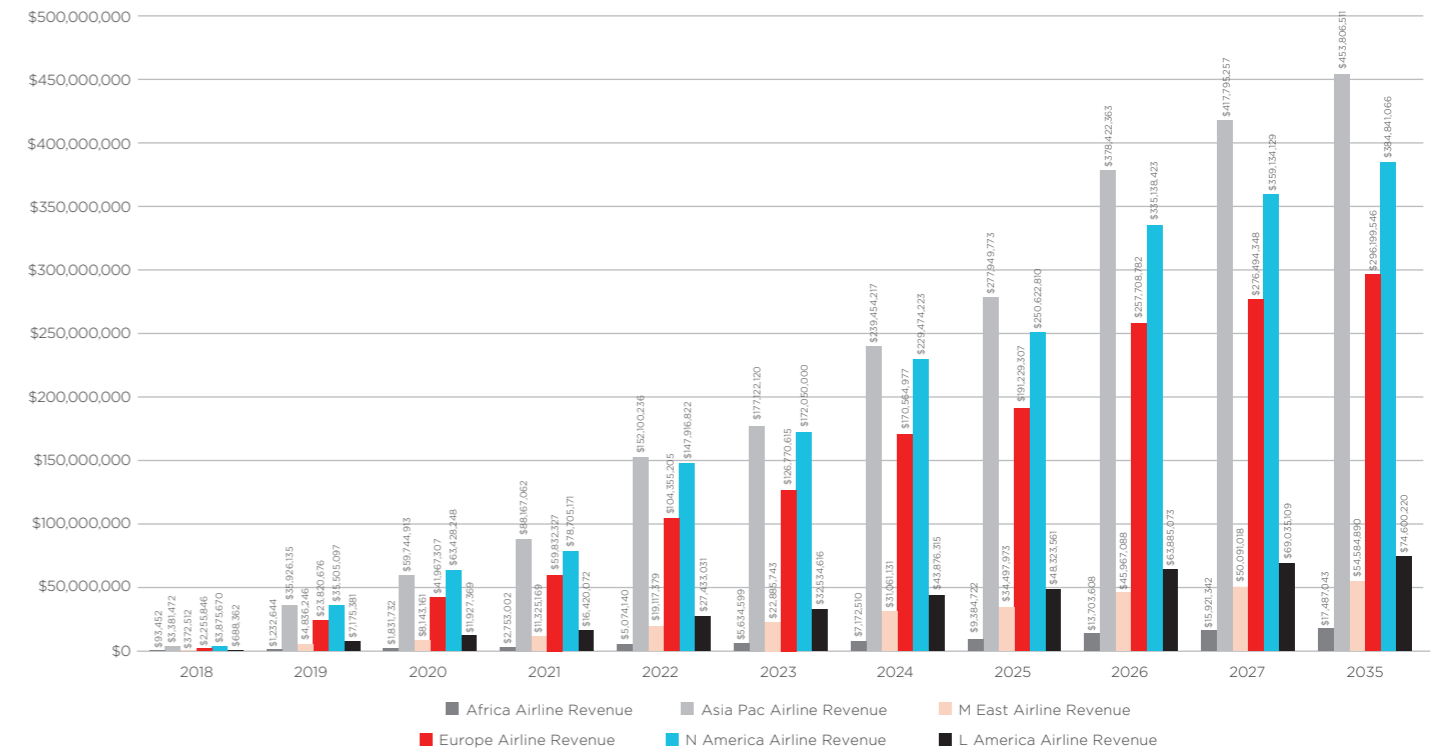
Chart 20: Broadband-enabled ancillary revenue for airline share of ad-supported free connectivity: 2018-2028

Chart 20 depicts the segmentation between regions for advertising-supported free connectivity between 2018-2028 by region.

Broadband Access Revenue

The generation of revenue from broadband access has to date formed the primary mode of monetising onboard cabin connectivity. This is expected to continue with the forecast opportunities, but the composition and size of other services could increase to balance this. The market reflects a variation in broadband service offerings between providers, and in turn, the provision of this to passengers between airlines, including 'free broadband'; restricted offerings based on speed, data, and other criteria; pricing based on blocks of time, flight duration; daily and monthly passes permitting access by region and 'global access', and others. Significantly, only a minority of flights offering passengers broadband connectivity have speeds that are comparable to terrestrial broadband,[75] although over 25% of airline seats globally offer onboard connectivity.[76] As defined earlier in Figure 1 quality is the dominant criteria sought by passengers. When combined with liquidity of supply and attractive pricing, this can maximise the generation of onboard broadband-enabled ancillary revenue.

The forecast of broadband access revenue utilises granular analysis driven by passenger forecasts by region, and the propensity of passengers to utilise both free and paid broadband onboard. Average current adoption rates for in cabin broadband have been utilised that reflect activity in markets such as North America, Europe, the Middle East and Asia Pacific, and adjusted to account for a variation between LCCs and FSCs through primary and secondary research. A spectrum of access plans have been developed reflecting many in the market today including monthly global, regional and airline-specific access plans; annual global and regional plans; 1, 3, 5 hour, and all-day access plans. Demand has been defined based on the distribution pattern of short, medium and long-haul flights factoring in other criteria including user segments and a migration of some passengers between plans over time, reflecting maturity in the market and the greater use of monthly and annual plans by some passengers as the market evolves. This also includes the adoption of broadband in the cabin by emerging long haul LCCs as well as FSCs. Table 8 summarises the potential market forecast for a 10-year planning horizon to 2028 based on data reflecting current revenue sharing arrangements. Revenue of $9 billion is forecast for airlines, from a forecast of $36 billion for the market.

Broadband Access Revenue

	2018	2019	2020	2021	2022	2023
Africa	$39,739,090	$46,993,313	$78,759,346	$141,464,021	$167,711,487	$252,665,121
Asia Pac	$716,917,661	$1,119,581,564	$1,862,050,638	$2,869,726,346	$3,677,648,954	$4,368,005,452
Middle East	$120,259,078	$197,761,554	$330,122,899	$513,113,495	$597,852,271	$666,722,359
Europe	$1,050,810,003	$1,338,275,112	$1,824,638,770	$2,811,065,430	$3,865,995,866	$4,607,999,549
N America	$1,182,782,207	$1,329,064,236	$1,845,717,517	$2,780,997,806	$3,790,727,541	$4,258,612,439
L America	$180,058,410	$292,647,277	$490,835,226	$765,497,695	$912,692,203	$990,103,615
Total Market Forecast	$3,290,566,450	$4,324,323,056	$6,432,124,395	$9,881,864,793	$13,012,628,322	$15,144,108,536
Airline Revenue	$822,641,612	$1,081,080,764	$1,608,031,099	$2,470,466,198	$3,253,157,081	$3,786,027,134

	2024	2025	2026	2027	2028
Africa	$277,278,845	$399,654,474	$572,784,812	$708,141,884	$965,127,231
Asia Pac	$4,894,816,779	$6,471,165,575	$7,919,820,924	$8,469,456,447	$10,430,537,564
Middle East	$863,786,206	$1,022,397,814	$1,236,099,360	$1,318,000,306	$1,516,175,317
Europe	$5,570,769,034	$7,006,957,690	$8,728,483,772	$9,221,847,646	$10,953,868,524
N America	$5,127,078,153	$6,451,615,057	$7,913,203,907	$8,291,157,122	$10,056,014,899
L America	$1,277,730,935	$1,577,822,770	$1,883,835,954	$1,995,649,820	$2,332,867,353
Total Market Forecast	$18,011,459,952	$22,929,613,380	$28,254,228,728	$30,004,253,226	$36,254,590,888
Airline Revenue	$4,502,864,988	$5,732,403,345	$7,063,557,182	$7,501,063,306	$9,063,647,722

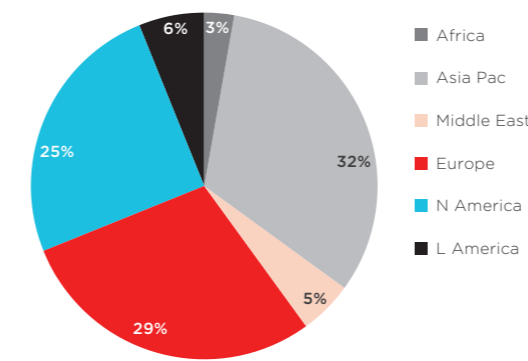Table 8: Forecast broadband access revenue: 2018-2028

Chart 21: Forecast regional proportion of revenue: 2035

Asia Pacific is forecast to account for the largest proportion of revenue in 2035 at 32% of the total market, followed by Europe (29%) and North America (25%). This is followed by Latin America (6%), the Middle East (5%) and Africa (3%). The potential exists for the Middle East to be ahead of Latin America, but at this stage, the dynamics of the market are fluid and variation could be observed across these regions. The market forecast from 2029-2035 is depicted in Table 9, indicating that the revenue for the airlines could potentially grow to almost $16 billion, from a total market forecast of $64 billion, with revenue accruing to other suppliers, as occurs today, such as satellite broadband providers, content providers, affiliate participants and others.

Broadband Access Revenue

	2029	2030	2031	2032	2033	2034	2035
Africa	$1,069,682,906	$1,175,105,314	$1,293,959,848	$1,384,917,098	$1,519,313,745	$1,585,537,369	$1,826,921,656
Asia Pac	$11,665,154,196	$13,117,053,436	$14,294,889,106	$16,120,257,010	$17,555,742,434	$19,072,431,679	$20,219,525,556
Middle East	$1,634,550,493	$1,824,829,153	$1,996,673,317	$2,121,661,220	$2,315,495,545	$2,508,129,069	$2,898,848,660
Europe	$11,831,608,522	$13,037,977,297	$13,875,087,543	$14,788,589,970	$15,623,368,801	$16,926,743,659	$18,561,174,441
N America	$10,804,405,179	$11,966,234,457	$12,799,823,467	$13,346,827,910	$14,161,043,238	$15,161,847,853	$16,043,867,859
L America	$2,576,323,290	$2,800,045,626	$3,038,042,128	$3,270,869,644	$3,539,615,171	$3,817,693,115	$4,125,655,044
Total Market Forecast	$39,581,724,586	$43,921,245,282	$47,298,475,408	$51,033,122,851	$54,714,578,934	$59,072,382,743	$63,675,993,215
Airline Revenue	$9,895,431,146	$10,980,311,321	$11,824,618,852	$12,758,280,713	$13,678,644,733	$14,768,095,686	$15,918,998,304

Table 9: Forecast broadband access revenue: 2029-2035

Estimates from some providers of airline broadband connectivity vary to the forecasts defined, due to the wider factors considered in the development of a holistic market opportunity. Other forecasts include a value of $1billion in 2016 for the North American airline broadband access market.[77] The 2017 forecast defined in this research is $0.8 billion with 2016 not estimated due to the forward-looking nature of this research with 2018 utilised as the first year of review. The forecast market potential for airline revenue by region between 2018-2035 is presented in Chart 22 reflecting the 20-year planning horizon utilised by IATA for passenger forecasts.
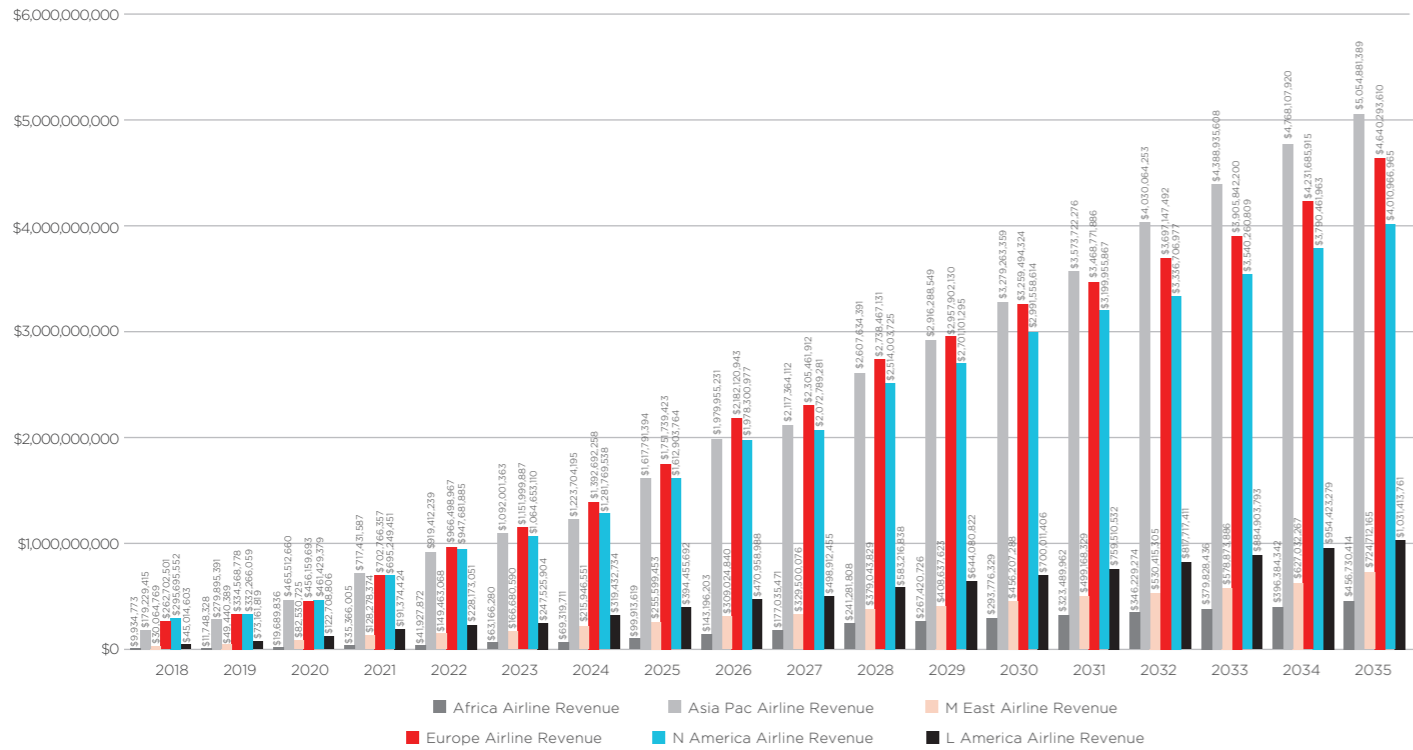

Chart 22: Airline forecast broadband access revenue by region: 2018-2035

Premium Content

The streaming of content has revitalised music and video, with online video now exceeding time spent by consumers on other platforms including social media and digital radio.[78] Consumers have an unrivalled selection of content, both 'basic' and premium, and multiple access options ranging from 'free' to subscription and pay-per-view. The streaming of content by airlines is an emerging opportunity enabled by high quality cabin connectivity, reflecting social trends observed at present. Users spend an average of one hour and 55 minutes per day with digital video, versus an hour and 44 minutes with social networks.[79] 'Trailing Millennials' (14-25 year olds) are the first group to now watch more shows on digital devices than television screens, with almost 75% of this group using streaming to watch their shows.[80] This trend is expected to continue with other groups such as Millennials and Generation X adopting this trend. This is also being fuelled by long form content providers such as Netflix, Amazon Prime and Hulu, with almost half of US digital viewers paying for online streaming via a subscription, and around one third also using a free site for content that is supported by adverts.[81] These trends are fuelling growth, with the global terrestrial video streaming market forecast to grow from $30.2 billion in 2016 to $70 billion by 2021,[82] and potentially reach $104 billion by 2030.[83] US consumers alone streamed 431 billion songs in 2016.[84] Consumer expectations of the ability to stream content (free or premium) are likely to increase as broadband quality improves and they engage more for entertainment, communication (email) and updates (social media).[85]

Content and entertainment can include more than 'streaming' for airlines, with premium content opportunities that do not necessarily require streaming speed Wi-Fi. Streaming can be added as a 'premium' service that requires connectivity to be taken-up in exchange for niche or other content such as live TV and sports events. Significant potential exists for live or near-real time TV, primarily focused on sports and other 'events', to enable this to occur. Demand for premium content could surge significantly when key sports events like World Cups, Olympics, football matches and others occur. Industry discussions indicated that this is already being viewed as a high priority by some airlines in North America and increasingly in Latin America.

Some airlines are already generating revenue through locally streamed W-IFE that is bundled into a Wi-Fi package, making conversion for premium content easier and more likely. Many passengers are currently bringing personal entertainment devices onboard that can be used to access streaming. This is creating an environment in which they can be more likely to pay for unconnected W-IFE services, because their device is at hand. Hence 'connectivity', although not an enabler of W-IFE, could be seen as an accelerator of the ancillary revenue it generates.

Streaming is set to continue its disruptive attributes in the cabin, with some airlines removing in-flight screens in favour of passengers utilising their own devices for either cached onboard content delivered through W-IFE, or for streamed content via satellite.[86] This can also reduce fuel costs through lower weight, with almost 700kg removed for a single aircraft. Primary research indicates that many airlines are undertaking a portfolio approach to both entertainment and cabin connectivity through the delivery of content via multiple modes including IFEC and BYOD. With 70% of passengers accessing entertainment channels and 80% travelling with at least one device,[87] the opportunity exists for inflight streaming (content from the ground to the plane) to complement IFE (content cached onboard) through W-IFE, with content streamed locally to BYOD devices.

The opportunity exists for airlines to maximise the opportunities offered by a connected cabin with forecasts identifying a number of opportunities for potential ancillary revenue generation enabled by broadband. This includes a tiered 'basic' and 'premium' offering, with analysis and forecasting based on a simple approach that contains the potential to be inclusive of numerous content offerings. Passenger research on 'satisfaction' indicates that 64% value entertainment and own-device use for streaming, text, email, above other inflight services, with around 56% of passengers willing to consider being up-sold full connectivity with 60% indicating that being in touch with the ground provides an emotional benefit.[88]

An additional area of forecast is the rental of access devices for passengers, with some airlines already offering this in light of regulatory changes or for passengers who do not possess their own device.[89] A proportion of passengers have been forecast to adopt this. This reflects a portion of users who may not possess a BYOD or those who may choose to use another device for entertainment. It also provides an alternative for any regulatory impediment to passengers using larger BYODs.

Forecasts quantifying the potential value of satellite streaming of content to the cabin have utilised a defined basic and a premium offering, following industry feedback, this could entail the 'bundling' of broadband access as depicted earlier in this paper, with the use of IFE and W-IFE.
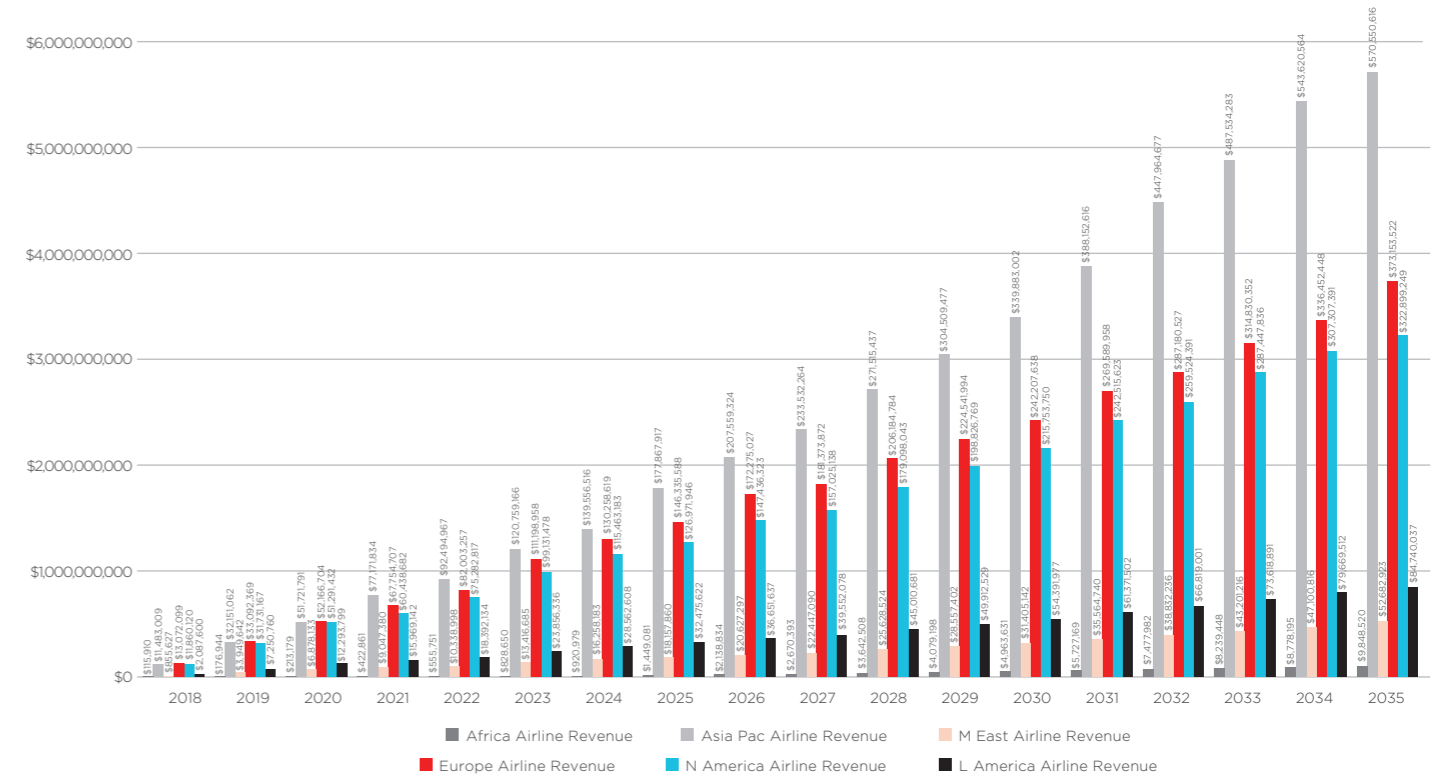
Premium Content

	2018	2019	2020	2021	2022	2023
Africa	$208,626	$319,014	$385,637	$758,824	$996,951	$1,483,523
Asia Pac	$11,483,009	$32,151,062	$51,721,791	$77,171,834	$92,494,967	$120,759,166
Middle East	$1,404,043	$6,710,926	$11,831,813	$15,603,739	$17,806,793	$23,139,037
Europe	$22,030,951	$56,601,373	$89,848,999	$116,893,234	$141,636,967	$193,058,706
N America	$19,555,725	$53,143,599	$87,085,546	$103,143,521	$128,096,697	$169,250,106
L America	$3,483,016	$12,325,082	$21,146,231	$27,537,884	$31,680,279	$41,152,667
Total Market Forecast	$58,165,369	$161,251,058	$262,020,018	$341,109,036	$412,712,654	$548,843,206
Total airline revenue	**$39,474,366**	**$108,351,945**	**$174,565,039**	**$230,804,605**	**$279,067,924**	**$369,191,274**

	2024	2025	2026	2027	2028
Africa	$1,649,081	$2,583,170	$3,821,839	$4,784,025	$6,510,842
Asia Pac	$139,556,516	$177,867,917	$207,559,324	$233,532,264	$271,515,437
Middle East	$28,050,264	$31,359,394	$35,589,214	$38,805,329	$44,047,179
Europe	$226,201,690	$254,118,233	$299,224,837	$316,181,773	$359,751,767
N America	$197,141,210	$217,205,936	$252,011,098	$269,393,419	$303,972,305
L America	$49,286,825	$56,113,916	$63,271,061	$68,407,295	$77,418,828
Total Market Forecast	$641,885,587	$739,248,567	$861,477,374	$931,104,104	$1,063,216,358
Total airline revenue	**$431,020,089**	**$503,258,013**	**$586,688,442**	**$636,600,835**	**$731,079,978**

Table 10: Forecast Premium Content revenue by region: 2018-2028

The forecast market revenue from this sector is around $39 million for airlines in 2018, as depicted in Table 10 rising to almost $0.7 billion by 2028. This is forecast to rise to rise to $1.4 billion for the airlines by 2035. Chart 23 depicts this distribution across regions.

Chart 23: Forecast airline premium content revenue by region: 2018-2035

E-commerce and destination shopping

'Traditional' ancillary revenue includes revenue airlines derived from hotel bookings; the sale of frequent flyer miles; the provision of à la carte onboard services and some other services.[90] The airline revenue from these is estimated to be $67 billion in 2018.[91] A step-change is required for airlines to extend this to broadband-enabled ancillary revenue that capitalises on e-commerce, mobile technology, changing consumption patterns, and low-cost, last-minute holidays. The most popular travel-related booking categories have remained relatively constant, and include airlines, hotels and auto-rentals, searched both through travel websites and directly, along with destination-related themes such as transfers; tours; tickets for attractions.[92]

Destination shopping represents one component of the e-tail opportunity. The potential is much larger however. In particular, the environment of onboard retail is currently restricted by size, weight and time, and the logistics of inventory management and delivery. Connectivity enables airlines to greatly expand their e-commerce duty-free offering to a wider range of goods that may be purchased less often, to higher priced goods, and to goods that can be conveniently delivered to a home or destination address. Connectivity also permits real-time credit card authorisation, resulting in lower fraud incidence and increasing the potential value of goods that can be sold. This is further maximised by increasing the time available for passengers to browse and purchase, rather than being restricted to circulation of the duty-free trolley onboard. E-commerce also creates the opportunity for innovative partnerships and concession models, where partner brands participate in the airline's e-commerce environment. Alternatively, this could occur through outsourced partnerships.

Amongst the drivers facilitating a change in the onboard connectivity paradigm is liquidity: this requires passengers to defer some of their trip purchases to when they are en route, including car hire, hotel and tour bookings, transfers, and general shopping. This permits airlines to capture bookings that currently occur pre- and post-flight without their participation. Factors facilitating the propensity of travellers to engage in this include:

- Over 40% of tour and activity bookings are made online, with these often made after arrival in a destination city or location;[93]

- 5% of tours and around 40% of entertainment activities and events are booked online before a trip, with this doubling in the space of 12 months;[94]

- 45% of travellers utilise their smartphone to book travel activities pre-trip;[95]

- Almost 100 million internet users utilised coupons to lower the cost of activities purchased online, and 20% use deals and savings apps when shopping;[96]

- 33% of Millennials, 25% of Generation X and 17% of Baby Boomers used mobile coupons in 2016.[97]

The broadband-enabled ancillary revenue model defined in this paper is shown in Figure 1. This highlights trends that primary research has indicated are relevant for airlines as they define a 21st Century connected-cabin model. Amongst the factors for consideration that spur forecasts are:

- Major city pair-routes offer opportunities for airlines to engage with global e-tailing brands such as Amazon across activities including the website/landing page, content and fulfilment, particularly for major cities where established operations exist. This includes the joint commercialisation of passenger data to personalise offers, commencing when the passenger has been 'captured', potentially from their app log-in at the start of their journey, through to landing at the destination. Connectivity with the passenger via a smartphone, tablet, or laptop, can deliver personalised destination offers via the airline or from a partner fulfilling this to the destination address;

- Other service offers can be delivered through targeted means via the same channels focusing on tours, attractions, transfers, coupons for discounts, with the development of a wider network of participating partners that can utilise both last-minute offers and tailored offers;

- Relationships with 'traditional' travel suppliers such as car hire and accommodation providers can be developed to provide tailored offers 'pushed' to the passenger based on route, destination, known preferences, and other criteria;

- Engagement with other e-tailors could be developed that provides a unique opportunity available only whilst a passenger is on route and connected that could result in purchases being dispatched to a residential address, or if developed with specific high-traffic routes that can be served from a logistical perspective, to the destination address.

These areas represent e-commerce not currently being captured within 'traditional' ancillary revenue activities with the exception of some accommodation, car hire and related purchases, but these are not occurring within the context of an on-the-move passenger that is targeted with personalised offers in real-time along the journey. This opportunity amalgamates suppliers, passengers and airlines in a just-in-time model that also provides added incentive in some cases for suppliers of services in particular to offer steeper discounts with short-dated items such as spare seats on buses for transfers; under-utilised rental vehicles; capacity in hotel rooms; and even events such as concerts, festivals, restaurant discounts, and other elements that generate zero return if not utilised by a specific period.

Table 11 consolidates the broadband enabled e-commerce opportunity. This is forecast to commence from a smaller base, generating $36 million revenue for airlines in 2018, growing to a forecast $3 billion in 10 years to 2028.

E-Commerce: Destination Shopping

	2018	2019	2020	2021	2022	2023	2024	2025	2026
Africa	$198,437	$1,026,595	$1,405,064	$2,343,648	$4,934,283	$8,846,394	$13,527,236	$20,936,464	$27,516,557
Asia Pac	$387,555,394	$1,022,130,370	$1,935,564,015	$3,539,843,723	$4,261,792,337	$4,968,028,402	$6,253,644,116	$7,912,041,252	$9,191,521,136
Middle East	$36,912,476	$149,189,520	$209,697,871	$374,416,180	$424,584,065	$509,168,333	$620,155,627	$691,311,179	$775,950,879
Europe	$5,988,291	$188,599,513	$298,044,089	$480,508,412	$1,401,028,579	$1,759,571,067	$2,712,134,647	$3,257,417,334	$3,915,787,696
N America	$10,757,986	$139,037,225	$218,023,979	$331,566,735	$1,199,620,929	$1,657,353,980	$2,095,156,240	$2,736,573,607	$3,264,158,431
L America	$1,470,824	$31,154,837	$46,059,030	$75,521,844	$305,933,923	$361,964,131	$601,678,415	$715,995,254	$819,452,630
Total Market Forecast	$442,883,408	$1,531,138,060	$2,708,794,048	$4,804,200,543	$7,597,894,116	$9,264,932,307	$12,296,296,282	$15,334,275,091	$17,994,387,330
Total airline revenue	$36,296,692	$205,713,726	$335,336,296	$568,452,536	$960,683,740	$1,185,200,998	$1,598,149,195	$2,008,126,692	$2,350,961,572

	2027	2028	2029	2030	2031	2032	2033	2034	2035
Africa	$47,345,635	$55,150,849	$66,182,266	$74,663,190	$88,657,904	$99,414,532	$109,046,712	$113,767,011	$131,059,707
Asia Pac	$9,937,244,152	$11,576,453,362	$12,971,190,139	$14,394,536,469	$18,750,021,929	$21,575,353,122	$23,428,190,481	$26,074,098,566	$27,367,086,558
Middle East	$829,393,676	$922,923,750	$1,001,361,690	$1,092,022,013	$1,208,626,350	$1,303,980,134	$1,443,353,933	$1,568,744,802	$1,748,341,650
Europe	$4,444,632,248	$5,174,209,094	$6,116,975,383	$6,942,759,403	$7,581,756,806	$8,935,812,027	$10,029,347,158	$10,740,924,602	$11,943,423,487
N America	$3,678,281,948	$4,227,711,801	$5,229,148,940	$5,750,630,591	$6,357,921,306	$7,567,511,041	$8,519,760,500	$9,108,888,069	$9,571,045,786
L America	$914,283,114	$1,084,541,021	$1,329,504,386	$1,475,057,907	$1,624,033,518	$1,925,462,058	$2,150,941,796	$2,334,127,979	$2,484,078,738
Total Market Forecast	$19,851,180,773	$23,040,989,877	$26,714,362,804	$29,729,669,573	$35,611,017,814	$41,407,532,914	$45,680,640,579	$49,940,551,030	$53,245,035,926
Total airline revenue	$2,675,975,826	$3,039,423,738	$3,522,629,782	$3,942,973,516	$4,524,617,675	$5,323,360,984	$5,886,910,289	$6,407,678,150	$6,856,507,452

Table 11: Forecast e-commerce destination ancillary revenue by region: 2018-2035

The market opportunity for this segment is considerable but requires a higher degree of participation by airlines if the benefits are to be realised. Chart 24 summarises the regional growth opportunity. The growth in Asia Pacific revenue is driven by passenger growth that is forecast by IATA to account for around 40% of total passenger numbers by 2035.[98]
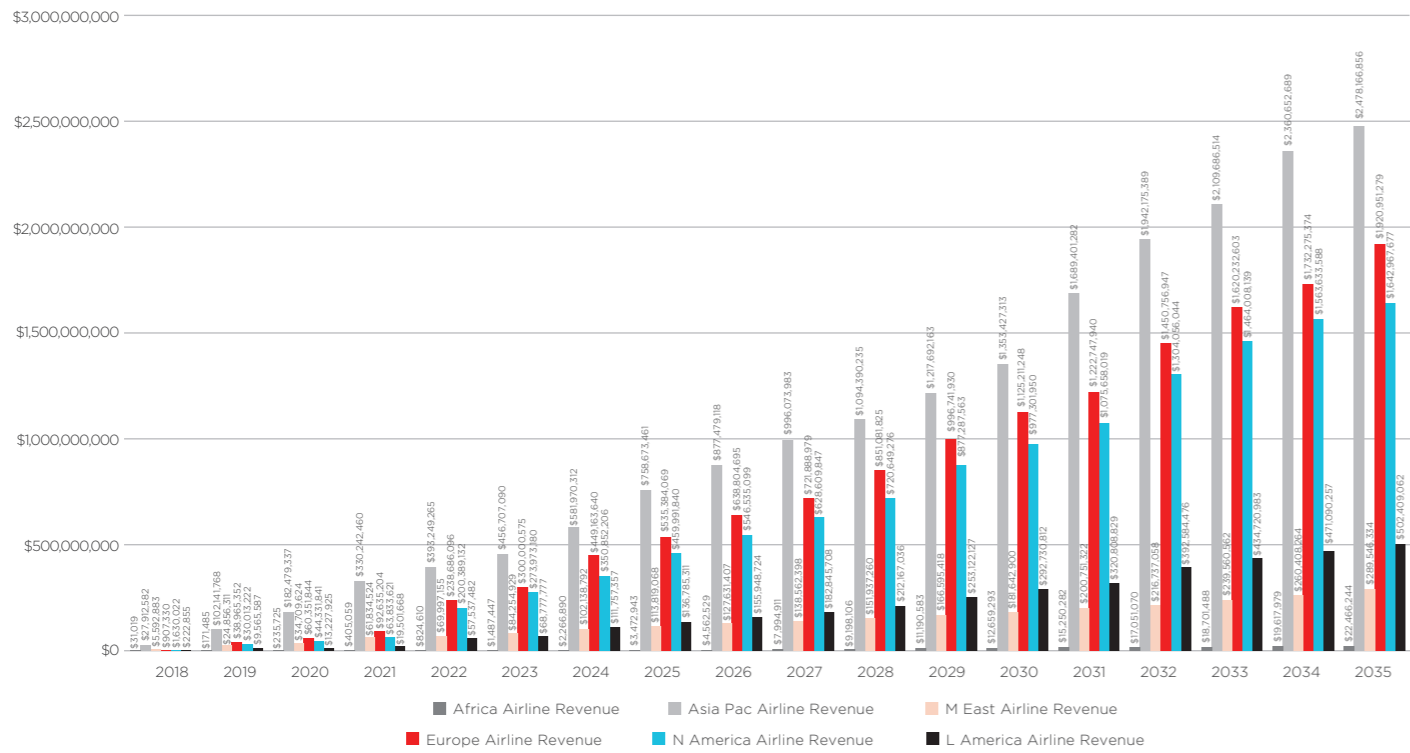
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$1,000,000,000

$500,000,000

$0

2018 2019 2020 2021 2022 2023 2024 2025 2026 2027 2028 2029 2030 2031 2032 2033 2034 2035

■ Africa Airline Revenue   ■ Asia Pac Airline Revenue   ■ M East Airline Revenue
■ Europe Airline Revenue   ■ N America Airline Revenue   ■ L America Airline Revenue

Chart 24: Forecast e-commerce airline destination ancillary revenue by region: 2018-2035

By 2035, e-commerce revenue for airlines is forecast to reach $6.8 billion, from a total estimated market of $53 billion. This product category has significant growth potential that can be capitalised if airlines offer passengers a relevant and large enough pool of products and services ('liquidity of supply') at an attractive price, with fulfilment options: both digital and physical. If this occurs, *trust* can be created and passengers are more likely to defer or undertake purchasing onboard.

Conclusion

The introduction of next generation satellites is ushering in high-bandwidth, continuous coverage. This is creating a step-change in the connected cabin with enhanced opportunities for airlines to develop broadband-enabled ancillary revenue that complements traditional ancillary revenue. Passengers display a propensity to pay more for high quality broadband, valuing this attribute above price. The formative nature of the broadband-enabled ancillary market in the cabin creates both opportunities and challenges: the development of broadband-enabled ancillary revenue by airlines requires alignment between content, products and services; technical and operational components; commercial arrangements and proactive airline participation. This entails the greater use of passenger data by airlines, and an engaged approach to monetising this.

This research has estimated that the total market size for broadband enabled ancillary revenue is $130 billion by 2035, with the airline component estimated to be $30 billion. The ultimate market size enabled by the advent of the high-speed cabin requires a review by airlines of their current operating model to define how revenue can be maximised from a 'captive pool' of consumers at 35,000 feet. Some segments are currently less defined, such as advertising, and could be lower than forecast depending on the operating and revenue models adopted, whilst others such as e-commerce and destination shopping, premium content and access revenue could exceed forecasts if the appropriate requirements exist.

The estimated near doubling of global passengers to 7.2 billion by 2035 provides the backdrop for airlines to develop broadband-enabled ancillary revenue. In contrast to a flattening of per passenger revenue from traditional ancillary revenue, broadband enabled ancillary revenue is at its infancy and has the potential to grow for both LCCs and FSCs for the categories defined. Due to the formative nature of this market, these opportunities could be higher or lower than those forecast in this research. As higher bandwidth becomes available in the cabin, airlines must ensure that they keep pace by developing their offers, infrastructure, operations and passenger engagement to the degree required to deliver and maximise connected-revenue. If this occurs, 'sky high' economics are attainable and airlines can gain a return on investment that translates into a growing contribution to their bottom line. This must also be accompanied by a shift in culture that puts passengers at the centre of a retailing and e-tailing ethos and personalises their journey: both onboard and to their destination.

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