“Sustainable growth in Aviation is dependent on the modernisation of our Airspace System to tackle key areas inefficiency and generate significant benefits for passengers, industry and the environment.”
AGENDA 14.00 – 16.30/17.00

1. FAS: MODERNISING THE AIRSPACE SYSTEM, Andrew Haines, CEO CAA.
2. OPERATOR’S PERSPECTIVE, Carolyn McCall, CEO easyJet.
3. AIRPORT INTEGRATION, Colin Matthews, CEO Heathrow Holdings Ltd.
4. NATS AIRSPACE PROGRAMME, Martin Rolfe, MD Operations NATS.
5. PLENARY DISCUSSION, chaired by Andrew Haines.
6. SESAR ALIGNMENT, Patrick Ky, CEO SESAR JU.
7. MILITARY PERSPECTIVE, AVM Baz North, ACAS MoD.
8. IMPLEMENTATION CHALLENGES, Corneel Koster, COO Virgin Atlantic.
9. BENEFITS, COORDINATION AND OVERSIGHT, Mark Swan DAP CAA.
10. PLENARY DISCUSSION, chaired by Andrew Haines.

DRINKS RECEPTION to 18.30.
FAS has been developed collaboratively with the Aviation Sector. Successful deployment will need even stronger engagement.

### STRATEGY TO IMPLEMENTATION

**FAS Developed**
- by CAA, NATS, MoD and DfT

**Gathered Feedback**
- Public Consultation
- Industry Responses
- 21st CN Class G

**Planned for Deployment**
- Align Industry Investment Plans
- Produce Network Benefits Case
- Define Policy and Regulatory Enablers

**Deployment of Phase 1 Priorities**
- Redesign the Route Network in Terminal Airspace
- Manage queuing across every phase of flight
- Connect Airports into the Network
- Implement Performance Based Navigation

**Airspace Transport Select Committee**

2009

2010

2011

2012

2013 – 2020
MODERNISING AIRSPACE – OPERATOR’S PERSPECTIVE

Carolyn McCall, CEO
easyJet

[speech, no slides]
AIRPORT INTEGRATION

Colin Matthews, CEO
Heathrow Holdings Ltd.

[speech, no slides]
NATS AIRSPACE PROGRAMME

Martin Rolfe, Managing Director Operations

NATS
“The Future Airspace Strategy describes the UK’s ambition to modernise the airspace system – i.e. the airspace structures, the routes aircraft fly and the systems and procedures used to manage the flow of traffic.”

**TODAYS AIRSPACE**

- Fragmented airspace structures.
- Frequent route interactions.
- High-Levels of tactical intervention.
- Traffic bunching and queuing.
- Reliance on conventional technologies.
“NATS’ Airspace Programme sits at the core the UK’s strategy to modernise airspace. NATS has played a leading role in the development of the FAS Strategy and production of the FAS Deployment Plan.”

**NATS AIRSPACE OBJECTIVES**

- To enable sustainable growth in aviation.
- To increase flight efficiency by removing bottlenecks.
- To reduce the cost of Air Traffic Management.
- To continue to enhance the safety of our airspace system.
“There are no silver bullets. Multiple initiatives and significant industry engagement are needed to improve continuously the way air traffic is managed and moves around the network.”

**KEY FAS RELATED INITIATIVES**

- Implementing a fundamentally more efficient route network in busy terminal environment.
- Streaming traffic, through speed control, to manage queuing and absorb delays.
- Allowing aircraft to climb continuously from take-off to cruise.
- Reducing stack holding, so aircraft can descend quietly and efficiently.
- Removing fixed airspace structures to allow for more direct routes.
“FAS affects every phase of flight across the en-route, terminal and runway environments. The airspace programme concentrates on improving the airspace design, queue management and the use of advanced systems and tools.”

### THE AIRSPACE INVESTMENT PROGRAMME

<table>
<thead>
<tr>
<th>Airspace &amp; Route Redesign</th>
<th>UK/Ireland FAB</th>
<th>LAMP / NTCA Network Design</th>
<th>Low Level SID / Arrival Routes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Queue Management</td>
<td>Arrival Management</td>
<td>Reduce Stack Holding</td>
<td>A-CDM and DMAN</td>
</tr>
<tr>
<td>Advanced Systems and Tools</td>
<td>Trajectory Management</td>
<td>Systemisation</td>
<td>EFPS &amp; Time Based Separation</td>
</tr>
</tbody>
</table>

En-route | Terminal | Runway
“The NATS Airspace Programme is part of an industry wide FAS plan. Airports, Operators and the Regulator each have an important roles in deploying new solutions successfully and realising the benefits.”

### INDUSTRY DEPENDENCIES

<table>
<thead>
<tr>
<th>Airspace &amp; Route Redesign</th>
<th>Airspace Design &amp; Consultation</th>
<th>Enhance Flight Planning</th>
<th>Low Level SID / Arrival Routes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Advanced Systems and Tools</td>
<td>PBN Mandate</td>
<td>CNS Equipage - Especially PBN</td>
<td>Implement A-CDM Systems</td>
</tr>
</tbody>
</table>

**Regulator**

**Operators**

**Airports**
“NATS initiatives form a significant part of the first phase of FAS implementation from 2013 to 2020.”

### THE CRITICAL PATH

<table>
<thead>
<tr>
<th>Control Period 3</th>
<th>Ref. Period 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>2013</td>
<td>2015</td>
</tr>
<tr>
<td>LAMP Design &amp; Consultation</td>
<td>LAMP 1</td>
</tr>
<tr>
<td>NTCA Design &amp; Consultation</td>
<td>NTCA</td>
</tr>
<tr>
<td>Early PBN Implementation</td>
<td>Full PBN Implementation</td>
</tr>
<tr>
<td>Upper Sectors Development</td>
<td>Remove fixed airspace structures across the FAB</td>
</tr>
<tr>
<td>AMAN in the FAB. &amp; Airport DPI Provision</td>
<td>Queue Mgmt. across FIR Boundaries &amp; Full A-CDM</td>
</tr>
</tbody>
</table>
“FAS has the potential to deliver significant benefits to passengers, the aviation sector and the environment. Airspace changes to accommodate the increasing demand for aviation will also make a significant contribution to economic growth.”

**BENEFITS**

- Airspace capacity to meet forecast demand out to 2025.
- Fewer delays and greater predictability, particularly on arrival into busy terminal areas.
- Potential significant fuel savings and maintenance cost reductions from greater flight efficiency.
- Enabling an increase in the efficiency of existing runway capacity.
- Significant reductions in aviation CO\(^2\) emissions.
“We only get one chance to modernise our airspace system. The overriding risk to FAS is that aviation stakeholders are incentivised to pursue narrow short-term goals at the expense of broader network wide improvements.”

HIGH PRIORITY RISKS

• Funding (RP2) and misalignment between costs and benefits.
• Mixed equipage levels & sub-optimal airspace designs.
• Redistribution of noise impacts at low levels.
• Operational behaviours and culture.
• Senior level sponsorship.

Severity
FAS AND SESAR DEPLOYMENT

Patrick Ky, Executive Director

SESAR Joint Undertaking
“The 2nd edition of the European ATM Master Plan was published in October 2012. It simplifies and prioritises Europe’s ATM Roadmap, concentrating on the essential operational changes that will generate early benefits and lay the foundation for the SESAR target concept.”

CONCEPT TO REALITY

• FAS is strongly aligned to the SESAR target concept and draws on the work undertaken for edition 2 of the Master Plan to identify essential changes.

• Through FAS the UK and Ireland have an opportunity to lead Europe in the early deployment of SESAR solutions...

• ...Especially the large, cross industry initiatives, with greatest potential to deliver benefits – such as PBN, Queue Management, CDO/CCO and A-CDM.
“As we move into the Deployment Phase local industry collaboration – enabled by initiatives such as FAS – will be critical to tailor SESAR solutions to specific areas of the network and establish robust local business cases.”

**LOCAL INDUSTRY COLLABORATION**

- SESAR solutions are successfully validated in controlled project/trial environments.
- Industrialising these solutions and integrating them into the local network is the main challenge that FAS and SESAR must tackle together to enable deployment...
- ...this requires a clear line of slight between local business cases, the airlines network-wide CBA and SES Performance Scheme Targets for RP2.
“FAS/SESAR alignment is an opportunity to put local developments – i.e. to improve airspace structures, change industry behaviours and update regulations – onto a joint programme footing with technical solutions.”

**FAS IS FOCUSED ON SESAR STEP 1**

- Step 1 of SESAR Deployment concentrates on flight efficiency, predictability and the environment through the shift to Time Based Operations.

- FAS should support the European Deployment Manager to coordinate local adoption of Step 1 technologies across Operators, Airports and ANSPs...

- ...and join-up the local changes required in airspace structures, industry operating behaviours and policy/regulation to realise the benefits.
BUT THERE ARE TECHNOLOGIES IN STEP 1 WHICH ARE NOT IN FAS...

KEY SESAR SOLUTIONS IN RELEASE 1

- Integrated Arrival and Departure Manager
- Extended AMAN Horizon
- Point Merge in Complex TMA

INTEGRATED ARRIVAL AND DEPARTURE MANAGER

Validation through live trial of enhanced Departure Manager in terms of procedures for establishing pre-departure sequence at Paris CDG

- Performance improvement in terms of target start-up time, *predictability* and stability of departure sequence
- Average taxi time decreased by 9%
- Improved adherence to CFMU slots

- **Reliability** of the DMAN in bad weather conditions
- Enhanced tactical scheduling of changes to runway capacity and configuration

<table>
<thead>
<tr>
<th>Time period (LT)</th>
<th>Improvement</th>
</tr>
</thead>
<tbody>
<tr>
<td>6H-7H</td>
<td>-15%</td>
</tr>
<tr>
<td>9H-10H</td>
<td>-9%</td>
</tr>
<tr>
<td>12H-13H</td>
<td>-8%</td>
</tr>
<tr>
<td>18H-19H</td>
<td>-37%</td>
</tr>
</tbody>
</table>

Delay at the runway threshold during peak hours
REMOTE TOWER

Assessment of the technical and operational capability for the provision of ATC service to a single aerodrome from a remote control site located approximately 100Km away.

Shadow mode operations at Malmö Sturup Airport, based on validation info from Ängelholm Airport.

- Under normal conditions, the controllers confirmed that a safe service could be provided remotely.
- Controller opinion was that the picture during day time was generally clearer and easier to interpret than night.
- The IR camera might allow increased opportunities and flexibility in working methods.
- Dutch NSA involved in validation activities.
FAS MAY NEED TO INCORPORATE MORE OF A EUROPEAN DIMENSION

KEY SESAR SOLUTIONS IN RELEASE 1

EXTENDED AMAN HORIZON

Validation at NATS London TC and NORACON Malmö of Extended Arrival Management to achieve sequencing traffic and reduced holding

- Feasibility of sequencing traffic in the en-route phase demonstrated
- Two types of sequence coordination: ATC to ATC and ATC to AOC

- In the London exercise, aircraft **fuel burnt** in the 500 nautical miles extended AMAN Horizon was reduced by 9% or 942 kg on average per flight

- Aircraft **stack holding** time in London was reduced by between 78% and 87%
**SESAR deployment cannot become a reality unless all actors concerned commit to work together.**

- The Future Airspace Strategy is a remarkable joint effort to address Air Traffic Modernisation in the UK and Ireland.
- This should be used as a benchmark for other countries to follow.
- It will be very interesting to see how this commitment converts into joint or coordinated investment decisions.

**Congratulations to all actors, this is the first concrete step for SESAR deployment in Europe**
MILITARY PERSPECTIVE

Air Vice-Marshal  Baz North
Assistant Chief of the Air Staff

[speech, no slides]
IMPLEMENTATION CHALLENGES

Corneel Koster, Director of Operations, Safety & Security

Virgin Atlantic Airways
“FAS provides the aviation sector with a framework to tackle the challenges of implementing major changes to our airspace system.”

**KEY IMPLEMENTATION CHALLENGES**

- **Prioritisation** – We can’t implement everything at once. Spreading our resources over too many initiatives will not maximise benefits.

- **Performance** – To ensure implementation is truly performance driven we need clarity on the targets, drivers and metrics.

- **People** – The impacts of implementation on operational personnel, industry culture and passengers’ expectations must be carefully managed.
“Scarce resources, complex programmes and a mix of vested interests mean prioritising where and when to implement changes will be a major challenge during the deployment phase.”

PRIORITISATION

• Prioritisation decisions must be clear and consistent, especially about trade-offs; Embedding FAS as part of a stable aviation policy framework will be a big help.

• Integrating new solutions with the existing operation is complex. New systems, procedures and airspace re-designs must be sequenced to realise benefits...

• ...But biting off too much will compromise performance. The risk of ‘initiative overload’, must be carefully managed with all stakeholder groups.
“We can all agree that deployment should be performance driven. The challenge is how. A clear line of sight between performance targets and implementation programmes is more important than ever.”

PERFORMANCE IMPROVEMENT

• FAS provides an opportunity to define the contributions that major changes to our airspace system are expected to make to performance.

• Linking the achievement of performance targets to cross industry delivery programmes can make implementation truly performance driven.

• Targets must be stretching but achievable. The emphasis on cost reduction should be balanced with new investments to drive performance improvements.
“Significant efforts are needed across industry and the regulator to ensure people are sufficiently engaged, trained and certified as implementation progresses.”

PEOPLE

• Tailoring solutions to the local network environment requires regular engagement with pilots, controllers and ground staff.

• The provision of training and certification must be robust and cost effective to ensure the required numbers of qualified resources are available.

• FAS deployment should also encompass the change management and social dialogue needed to evolve industry culture and passengers expectations.
BENEFITS, COORDINATION AND OVERSIGHT

Mark Swan, CAA Director Airspace Policy
“FAS Deployment must be performance driven. Clear links between programmes and performance improvements will inform decisions on how and when to implement changes.”

**PERFORMANCE DRIVEN**

- Benefits – consistent CBA methodology.
- Coordination – across industry, supported by FAS MOU.
- Oversight – of programme delivery, driven by FAS Deployment Steering Group.
FAS CBA METHODOLOGY

- Concentrates on Operational Improvements.
- Fuel, Cost, Time and CO$_2$ savings quantified.
- Cross UK / Ireland FAB in scope.
- Majority of the benefits in the South East of England.
- Detailed analysis of Continuous Climbs informs methodology for other improvements.

“FAS CBA methodology focuses on defining the benefits of operational improvements at a network level.”
"CAA has conducted a detailed Cost Benefit Analysis for one operational improvement – Continuous Climb Operations – to develop a methodology that supports wider FAS CBA work."

CONTINUOUS CLIMB OPERATIONS

- Detailed analysis of one operational improvement
- Fully systemised Continuous Climb Operations across UK
- Expected benefits of £142m - £208m depending on implementation timescales (2013 – 2030 NPV).
- Approach and lessons are informing wider FAS CBA.
- Full CAA report available early 2013.
- Work progressing on industry costs – more data needed!
• High / low case benefits at a network level – net present value projected 2013 to 2030.
• Based on Eurocontrol standard inputs and CBA methods developed by the CAA.
• Fuel and cost savings are direct benefits to operators.
• CO₂ savings presented as economic valuation of societal benefits.
• Delay benefits capture opportunity cost of passengers time – consumer objective.
• More detailed breakdown of benefits by major FAS initiative across the en-route, terminal and runway environments set out in the FAS Deployment Plan, Iteration 3 v1.2.
• Conservative assumptions around benefit delivery and timescales be refined in spring 2013.

Highest level summary of FAS benefit estimates – December 2012.

- £2.45bn HIGH CASE
- £1.88bn LOW CASE
- £588m DELAY
- £441m FUEL
- £446m CO2
- £411m COST
- £188m COST
- £338m FUEL
- £907m
“Industry coordination is dependent on commitment of organisations to collaborate in FAS deployment activities. FAS has adopted the use of a Memorandum of Understanding to capture intent to align investment plans.”

FAS MEMORANDUM OF UNDERSTANDING

Three layers

1. Endorsement of FAS approach and commitment to collaborate in implementation / benefits realisation - signed-off at exec level.

2. Summary of the alignment between organisational plans and specific areas of the FAS Deployment Plan.

3. Summary of the areas of misalignment, issues, risks and external dependencies.

NB: The MOU is not a legally binding document.
NEXT STEPS

• Full level one plan published end of December on www.CAA.co.uk/FAS incorporating feedback.

• Plans and detailed delivery schedules become living docs.

• First FAS Deployment Steering Group Jan 2013.

• Agree 2013 projects and milestones (aligned to SESAR).

• Bi monthly delivery reports / six monthly benefits reports.
PLENARY DISCUSSION #2