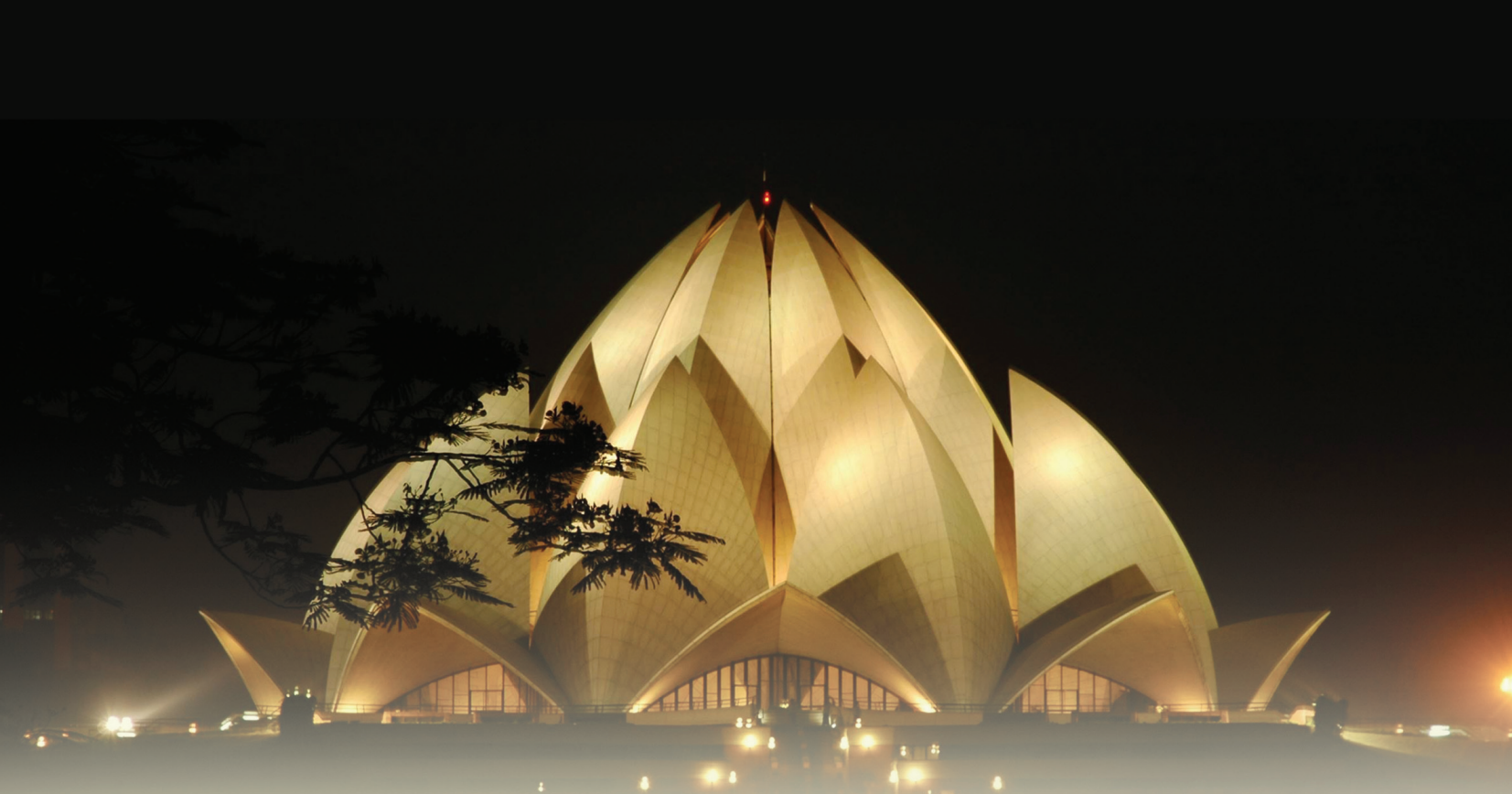


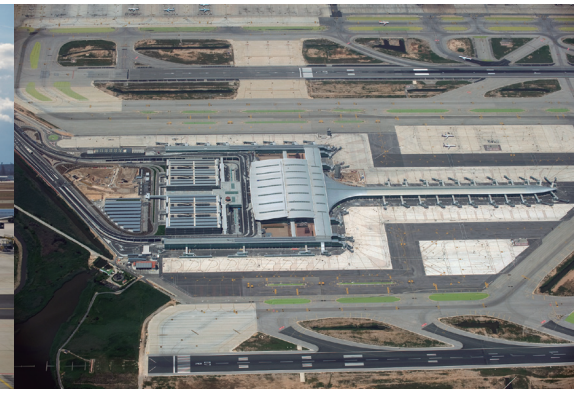
42nd IFATSEA General Assembly

10-14 September 2012
New Delhi, India

Organized by

CNS Officers' Guild
of Airport Authority of India

LEADING SOLUTIONS FOR ATM AND AIRPORTS



THE MOST ADVANCED TECHNOLOGY

Indra is a world leader in Air Traffic Management and Control Systems, with over 90 years' experience in the turn-key provision of technologically complex projects with successful results. More than 3000 Air Traffic Management installations have been supplied by Indra in over 140 countries, covering all continents. Its turnover in 2011 was €2.688 billion, and more than half of its income is from international markets. The company employs 40,000 professionals.

Indra is the leader in technological innovation in ATM. In 2008 it completed the development and implementation of the first European trajectory-based flight management system, which was fully commissioned in the same year at the Maastricht Upper Area Control Centre operated by Eurocontrol. In 2011, it once again left its competitors behind by implementing and commissioning the first 4D (3D + Time) trajectory-based flight management system, which is operational at the DFS control centre in Karlsruhe.

Indra is one of the companies most involved in the Sesar R&D project, the technological pillar of the Single European Sky initiative.

INDRA REFERENCES IN AIRPORTS AUTHORITY OF INDIA

Indra has been recently awarded two contracts by the Airports Authority of India to commission the new Kolkata Air Traffic Control Centre, and to implement four simulation systems to train controllers in Delhi, Mumbai, Chennai and Kolkata.

These new contracts reinforce the company's solid position in the country. Indra's achievements in India so far include two major projects in 2010 to deploy 9 Mode S radar stations and implement its air traffic management systems in the towers of 38 airports. At the time, this project constituted one of the largest contracts ever awarded in terms of the number of systems anywhere in the world.

The AAI has once again trusted in Indra's experience and know-how for its new control centre at Kolkata, which will include those functionalities found in the most modern systems in the world. This centre will be one of the four biggest in the country and, due to its location, will control a significant proportion of flights to and from Southeast Asia.

The four approach and tower simulators for the country's main centres will provide the AAI a platform to carry out analyses and obtain statistics on the type of traffic using its airspace. It will also be able to simulate complex air traffic management scenarios and train its personnel to handle unusual situations and emergencies.

Welcome

अजित सिंह
Ajit Singh

नगर विमानन् मंत्री,
भारत सरकार,
राजीव गांधी भवन,
सफदरजंग हवाईअड्डा, नई दिल्ली – 110003
Minister of Civil Aviation
Government of India
Rajiv Gandhi Bhawan
Safadarjung Airport, New Delhi-110003

Message

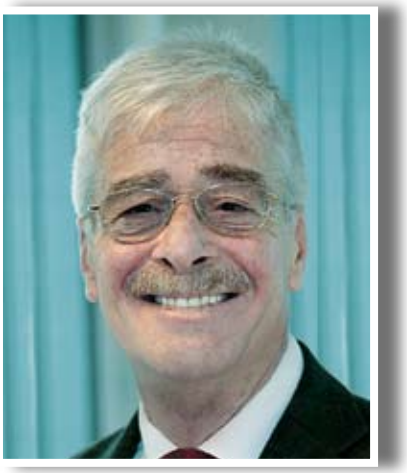
I am very happy to know that the CNS Officer's Guild of Aiports Authority of India is hosting the 42nd IFATSEA General Assembly in India from 10th to 14th September, 2012 at New Delhi.

This Ministry is proud and happy that a professional body of the CNS engineers and technical personnel (Air Traffic Safety Electronics Personnel (ATSEPs) of Airports Authority of India has taken up this responsibility of hosting the IFATSEA General Assembly in India. I commend the contribution of the Indian affiliates "CNS Officers Guild" in arranging this international event.

International harmonization is mandatory to a safe, secure and efficient aviation industry. These assemblies give a platform for the member countries to exchange information so as to meet the challenges in this fast growing aviation industry for a better and safer global sky.

I extend warm greetings and felicitations to the delegates and participants and wish for the success of the General Assembly.

(Ajit Singh)



Raymond Benjamin
Secretary General

INTERNATIONAL CIVIL
AVIATION ORGANIZATION

Message

A specialized agency of the United Nations, the International Civil Aviation Organization (ICAO) promotes the safe and efficient development of global civil aviation. As many of you are aware, ICAO achieves this mandate through the development of international Standards and Recommended Practices which are informed by industry and agreed by its 191 Member States. The International Federation of Air Traffic Safety Electronics Associations (IFATSEA) is one of many valued contributors in this regard.

IFATSEA's ongoing assistance in defining the international competencies which will serve to support continued excellence in the field of air traffic safety electronics is very much appreciated by ICAO and its relevant expert groups. Your continued input is important to aviation progress in this area.

In light of the fact that the aviation system in place today is on the cusp of a new era in automation, the role of engineers and technicians in maintaining and improving aviation's already enviable safety record will only increase in scope and importance moving forward. I therefore look forward to our respective organizations working even more closely together as air transport embarks on this unprecedented period of technical modernization.

I thank you all for your demonstrated commitment to aviation safety and wish you a very productive 42nd Assembly.

Raymond Benjamin

सचिव
भारत सरकार
नागर विमानन् मंत्रालय
नई दिल्ली – 110003

SECRETARY
Government of India
Ministry of Civil Aviation

K.N. Shrivastava, IAS

Message

The undersigned is pleased to know that the 42nd IFATSEA General Assembly 2012 is being organized by the Indian affiliates of the International Federation of Air Traffic Safety Electronics Associations, that is, the CNS Officers' Guild of Airports Authority of India, from 10th to 14th September 2012 at New Delhi.

The engineers and technical personnel in the technical domain of Air Navigation Services Air Traffic Safety Electronics Personnel (ATSEPs) has been contributing to air safety as per the ICAO Standards and Recommendation Practices and the Civil Aviation Requirements of the Regulatory Body of the respective countries. The services of these highly skilled professionals in the aviation industry are well recognized. With the growing air traffic and the advancement of technology the ATSEPs need to regularly update themselves. Such international events make the professionals across the globe to sit under one roof and share information and knowledge.

I would like to congratulate CNS Officers' Guild of Airports Authority of India for hosting this international event of the International Federation of Air Traffic Safety Electronics Associations (IFATSEA) for the first time in India. I hope that CNS Officers' Guild will continue to organize such events in future also.

I extend warm greetings to the delegates and participants and wish a grand success of the 42nd IFATSEA General Assembly.

(K.N. Shrivastava)

विजय प्रकाश अग्रवाल
V. P. Agrawal
अध्यक्ष
Chairman

भारतीय विमानपत्तन प्राधिकरण
Airports Authority of India
राजीव गांधी भवन
Rajiv Gandhi Bhawan
Safdarjung Airport, New Delhi-110 003
सफदरजंग हवाई अड्डा, नई दिल्ली – 110003

Message

It gives me immense pleasure to know that CNS Officers' Guild, the professional body of the CNS Engineers and Technical personnel of AAI, is organizing the 42nd IFATSEA General Assembly in India from 10th to 14th September 2012 at New Delhi.

The Topic for the General Assembly, IFATSEA is the Global Voice of ATSEP is quite apt in view of the continuous efforts and handwork of IFATSEA in bringing Global recognition to the profession of electronics engineers in the Industry.

It is pleasing to note that CNS Officer's Guild has once again risen to the occasion by organising the event in India. I am more than certain that the deliberations during the event would not only be meaningful and constructive but would also; undoubtedly bring out viable solutions in the field of CNS.

I on behalf of Airports Authority of India, being the sole Organization responsible for Air Navigation Services in the country, welcome the delegates and participants of the 42nd IFATSEA General Assembly to India and wish CNS Officers' Guild and the event the very best and all the "Success".

(V. P. Agrawal)

यशवंत भावे
अध्यक्ष
Yashwant Bhave
Chairman

भारत सरकार
भारतीय विमानपत्तन आर्थिक विनियामक प्राधिकरण
एरा भवन, प्रशासनिक कॉम्पलैक्स
सफदरजंग एयरपोर्ट, नई दिल्ली – 110003
Government of India
Airports Economic Regulatory Authority of India
AERA Building, Administrative complex
Safadarjung Airport, New Delhi-110003
फोन / ***Tel : 011-24695033*** फैक्स / ***Fax: 011-24695034***
ई–मेल / ***E-mail: chairperson@aera.gov.in***

Message

I am happy to know that CNS Officer's Guild is organizing the 42nd IFATSEA General Assembly in India from 10th to 14th September 2012 at New Delhi.

I am sure the deliberation at the Assembly will help in further enhancing the level of knowledge and awareness of the latest trends in the aviation industry across the globe thereby benefitting the participants in general and the aviation industry in particular.

The Air Traffic Safety Electronics Personnel (ATSEPs) plays a crucial role in their technical domain in the Air Navigation Services. With the growing aircraft movement, safe air traffic services heavily depends on the various communication, navigation, surveillance and air traffic management (CNS/ATM) systems sustained by these expertise.

I would like to take this opportunity to appreciate CNS Officer's Guild for organising such international events and wish a grand success of the 42nd IFATSEA General Assembly.

(YASHWANT BHAVE)

अरुण मिश्रा, भा प्र से
Arun Mishra, IAS

महानिदेशक नागर विमानन्
तकनीकी केंद्र
सफदरजंग हवाई अड्डा, नई दिल्ली – 110003
Director General of Civil Aviation
Technical Centre
Opposite Safadarjung Airport, New Delhi-110003

Message

It gives me immense pleasure to know that the CNS Officer's Guild is conducting 42nd IFATSEA General Assembly 2012 for the first time in India.

Due to rapid advances made in the aviation sector, it is imperative to adopt latest technologies emerging in CNS & Aeronautical field. I am sure that this Assembly will give an opportunity and platform to aviation experts to have fruitful interaction on the subject.

I wish the event a grand success.

27/8/12

(Arun Mishra)

David McMillan
Director General

EUROCONTROL

From the Desk of David McMillan

2012 is proving to be a very busy time for ATM. In November, ICAO will hold one of its infrequent Air Navigation Conferences, an event that provides a rare opportunity to make global decisions that will set the tone for the development of ATM for years to come. EUROCONTROL is working closely with other bodies, such as the European Civil Aviation Conference (ECAC), to ensure that Europe speaks with a single, clear voice in Montreal.

The concept of Aviation System Block Upgrades will be central to the discussions and to the revision of the Global Air Navigation Plan. We welcome this approach, which is very much in line with the developments in Europe and with the framework of SESAR.

There will be a lot to discuss – with papers being prepared on topics ranging from system-wide information management (SWIM) to the integration of remotely piloted aircraft. Many of these subjects need a global view and global standards to ensure that we achieve effective interoperability.

We also need to look at the issues surrounding deployment, in particular financing and synchronisation. Here incentivisation may be helped by new principles such as "Best Efficiency Best Served", where airspace users recognise that they will get a better service and fewer delays, but only if they introduce the latest developments.

These are ideas that will have an impact around the world but are especially pressing in Europe as we seek to improve the ATM system in the face of very challenging times for our economy. We need to move forward at the right speed, striking a balance between the cost of implementation and the need to be ready for future increases in traffic.

A real help in this process is the greater focus on performance, which has been a notable part of the Single European Sky initiative. Air Navigation Service Providers and, increasingly, airports are now being held to account for their results and we are already seeing changes in their behaviour.

Another major change in ATM in Europe has been the much greater emphasis on the network. This is most evident in the creation of the Network Manager, a role which we at EUROCONTROL have taken on and which is progressing well. It can also be seen in the way that airports are progressively becoming more integrated into the ATM system, often through the adoption of Airport Collaborative Decision Making. There are real benefits to be achieved here as information flows much better, the predictability of traffic flows improves and as all the parties at the airport combine to tackle the causes of delays.

All of this progress is, of course, impossible without the dedication and the hard work of the members of IFATSEA, with whom my Agency has worked so effectively for many years. So I would like to pass on my very best wishes for an interesting and successful General Assembly!

David Mcmillon

वी. सोमासुन्दरम
V. Somasundaram
सदस्य (ए.एन.एस)
Member (ANS)

भारतीय विमानपत्तन प्राधिकरण
Airports Authority of India
राजीव गांधी भवन
Rajiv Gandhi Bhawan
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E-mail: memberans@aai.aero

Message

I am extremely pleased to note that the CNS Officers' Guild is hosting the IFATSEA General Assembly 2012 in September 2012 in India. The timing and the subject of the meeting in India is very appropriate considering that AAI, as a major ANSP, is poised for major CNS-ATM transformation in the Asia Pacific Region. Our CNS/ATM achievements and our major Technological initiative GAGAN are playing towards global interoperability of the systems and seamless aircraft operations in the Region. Such global endeavors necessitate adherence to International standards and best practices.

I am very confident that the meeting of professionals from various countries across the globe would deliberate on all the issues pertaining to ATSEP leading to uniform application of standards and international best practices for provision of safe, efficient and reliable Air navigation Services in the country and the Region.

I am sure, the meeting will also serve as an ideal platform to bring all the stakeholders together in sharing valuable technical information on the upcoming CNS/ATM systems and discussing the way forward towards Regional/Global harmonization.

I wish the 42nd IFATSEA General assembly all success.

31/7

(V. Somasundaram)

के.के. झा
K.K. Jha
सदस्य (मानव संसाधन)
Member (Human Resource)

भारतीय विमानपत्तन प्राधिकरण
Airports Authority of India
राजीव गांधी भवन 'सी' ब्लांक
Rajiv Gandhi Bhavan
सफदरजंग हवाई अड्डा, नई दिल्ली – 110003
Safdarjung Airport, New Delhi-110 003
Ph: 011-24632946, Fax: 011-24610840
Res: 011-24631362

Message

I am please to know that the IFATSEA General Assembly is being organized by the Indian affiliates CNS Officers' Guild from September 10-14, 2012 at New Delhi. This historical event of the IFATSEA General Assembly for the first time being hosted in India is indeed a happy occasion for all.

I am sure the discussion and decisions taken in the Assembly will help in further enhancing the level of professionalism amongst the ATSEPs and will also benefit the aviation community across the globe.

I would like to congratulate the CNS Officers' Guild for their exemplary management in organizing such international events.

I extend warm greetings to the delegates and participants and wish a grand success of the 42nd IFATSEA General Assembly.

(K. K. JHA)

S. Raheja
Member (Planning)

भारतीय विमानपत्तन प्राधिकरण
Airports Authority of India
राजीव गांधी भवन 'सी' ब्लांक
Rajiv Gandhi Bhavan
सफदरजंग हवाई अड्डा, नई दिल्ली – 110003
Safdarjung Airport, New Delhi-110 003

Message

I am happy to know that the 42nd International Federation of Air Traffic Safety Electronics Associations (IFATSEA) General Assembly 2012, a first-of-its-kind Assembly being hosted in India by CNS Officers' Guild, a proud moment for the Air Traffic Safety Electronics Personnel (ATSEPs). This does show-case the determined efforts put in the CNS Officers' Guild to connect India globally.

The ATSEPs are the technical nerve centre of Air Naviagation Services, which is vital to the aviation industry in ensuring safety of aircraft operations. I am given to understand that ATSEPs are mainly engineers, technicians, hardware and software specialists who are responsible for the specification, procurement, installation, calibaration, maintenance, flight testing and certification of ground electronic systems controlling aircraft movements. The tasks which they are entrusted, speak volumes about their specialization and critical operational presence, for the safety of air passengers.

Appreciably, the CNS Officers' Guild has contributed , over the years, confronting with manifold increase in number of flights that operate in the sky, keeping abreast with the fast=paced technological advancements.

I hope this General Assembly would provide, for sure, the necessary technical updates to the professionals in the field. I am also optimistic that this Assembly would be a concrete knowledge sharing platform, amongst the knowledge spearheads, for the overall benefit of the industry and for a safe future of Air Navigation, world-over.

I wish the CNS Officers' Guild all success in this venture.

(S. Raheja)

जी के चौकियाल
G.K. Chaukiyal
सदस्य (प्रचालन)
Member (Operations)

भारतीय विमानपत्तन प्राधिकरण
Airports Authority of India
राजीव गांधी भवन 'सी' ब्लांक
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E-mail: memerops@aai.aero

Message

*At the outset I welcome all the delegates and participants to the **42nd IFATSEA General Assembly** in India. It gives me immense pleasure to know that the professional body of the CNS engineers and technical personnel, **CNS Officers' Guild** of Airports Authority of India have taken this responsibility to bring ATSEPs from all across the globe in India through this General Assembly.*

*Safety and Security are the key words in aviation and the ATSEPs play a very important role in their technical domain. The globally accepted terminology of their profession **Air Traffic Safety Electronics Personnel** itself explains their role in the aviation sector. The continuous efforts and hard work of IFATSEA has brought a global recognition of the profession in the aviation community. It makes me proud to know the active participation of CNS Officers' Guild in IFATSEA activities.*

*I understand that this year Topic for the General Assembly is **"IFATSEA is the Global Voice of ATSEP"**. I wish them all success in meeting their objective.*

Finally, I would like to congratulate CNS Officer's Guild and IFATSEA for organizing this event in India and also wish them a very successful General Assembly.

(G.K. Chaukiyal)

एस. सुरेश
S. Suresh
सदस्य (वित्त)
Member (Finance)

भारतीय विमानपत्तन प्राधिकरण
Airports Authority of India
राजीव गांधी भवन
Rajiv Gandhi Bhawan
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Safdarjung Airport, New Delhi-110 003
Ph: 011-24610845, Fax: 011-24610841
E-mail: s.suresh@aai.aero

Message

I am pleased to know that CNS Officer's Guild has taken the initiative of organizing International Federation of Air Traffic Safety Electronics Association (IFATSEA) General Assembly from 10-14 September, 2012 for the first time in India and also releasing a Souvenir on this occasion.

The Air Traffic Safety Electronics Personnel like engineers and technical persons have all along been playing an important role in system specification, procurement, installation, calibration, maintenance, flight testing and certification of ground electronic systems, controlling aircrafts movements and thus acting as the backbone for providing safe and efficient Air Traffic Services. This mega event will certainly provide an opportunity to all the delegates to share their views and discuss the emerging trends in this sector.

I would like to take the opportunity to convey my best wishes to CNS Officers' Guild for the success of this international event.

(S. Suresh)

Daniel Boulet
President, IFATSEA

International Federation of Air Traffic Safety Electronics Associations

From the Desk of the President

Welcome to New Delhi and the 42nd Assembly of the International Federation of Air Traffic Safety Electronics Associations ("IFATSEA")! There are few places more fitting to discuss the importance of aviation technology and advancement of air traffic management systems than India. A safe and efficient civil aviation infrastructure is vitally important to India's economic development as it grows to become one of the world's leading economies.

IFATSEA gratefully thanks the Ministry of Civil Aviation, Airports Authority of India, Ministry of Home Affairs, Ministry of External Affairs, Government of National Capital Territory of Delhi and indeed all the sponsors and exhibitors for making this event possible. Of course, special thanks and congratulations go to the CNS Officers' Guild for organizing this international gathering of Air Traffic Safety Electronics Personnel ("ATSEPs"). Your dedication and enthusiasm is further proof of your professionalism.

I urge everyone to take advantage of everything this conference has to offer. Your participation is vital to a successful and engaging conference.

Daniel Boulet

Dany Van der Biest
Executive Secretary,
IFATSEA

International Federation of Air Traffic Safety Electronics Associations

Message

It is a real honor for IFATSEA to be hosted for this General Assembly by its Indian IFATSEA affliate.

The CNS Officers Guild deserves sincere congratulations for the work and efforts done to bring the ATSEP community together in this wonderful country, as well as for the strong commitment of raising the profile of ATSEPs.

I am convinced that, this event will inject new, positive, energy into the Federation.

It attracts and inspires young ATSEP to become part of the next generation of leaders in the CNS/ATM field.

It strengthens our vision statement, as underlined in the IFATSEA Strategic Plan; "IFATSEA is the global voice of the ATSEP".

With warm regards

Dany Van der Biest

Capt. Don Wykoff
President

I·F·A·L·P·A

International Federation of Air Line Pilots Associations

Message

On behalf of the International Federation of Air Line Pilots' Associations I would like to wish the 42nd IFATSEA General Assembly every success during its forthcoming meeting in New Delhi on 10th - 14th September 2012.

Capt. Don Wykoff

NAVCANatm

Integrated air traffic management
Proven. Trusted. Applied.

IF YOU COULD SEE WHAT I SEE

You would see a fully integrated system of advanced air traffic management products, right at your finger tips.

NAVCANatm technology solutions are developed collaboratively with engineers, electronic technologists and the controllers who trust and use these systems every day. Our products are used at more than 80 sites world-wide and are designed to offer fast, reliable access to critical airport, tower and terminal information, bringing a higher level of safety, functionality and ease of use than any other system out there today.

Our new integrated tower system, NAVCANsuite, includes the leading electronic flight strip solution, a fused surveillance system with real-time coverage from ground to air, and automated ATM tools that deliver critical operational data. Fully integrated with these applications is NAVCANlink, a collaborative tool giving non-operational users a near real-time webview of airport radar, traffic, weather, lighting and navaid status – anywhere, anytime.

And whether you want the fully automated power of NAVCANsuite, or the advanced capability of one of its products, all NAVCANatm solutions are built to your requirements.

So come and see the only innovative ATM technology solution with an operational advantage – NAVCANatm.

www.NAVCANatm.ca

NAV CANADA

NAVCANatm is a division of NAV CANADA,
a proud sponsor of the 42nd IFATSEA Assembly.

HITT TRAFFIC

Grintex
Your Partner in Growth

era

Profile of HITT Traffic

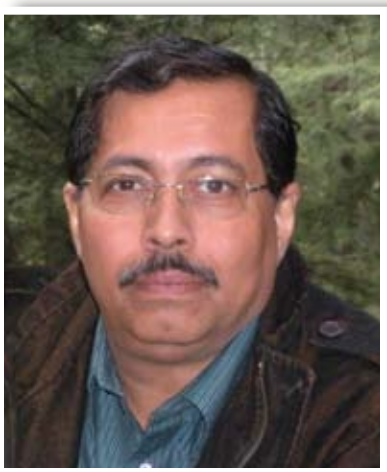
Airport operations and the availability of accurate, timely information strongly affect Air Traffic Management performance. HITT Traffic has a long track record in supplying Advanced Surface Movement Guidance and Control Systems (A SMGCS) and Surface Movement Radar (SMR) systems to ensure safety of operations and maximize airport capacity in all weather conditions. Our systems are operational at many airports around the world, including Chennai, Kolkata, Mumbai, New Delhi, Frankfurt, Singapore and Shanghai. We also provide comprehensive solutions to share an accurate picture of airport operations in real-time. Information that benefits ANSPs, airport service providers and airlines.

HITT's Airport Traffic Management solutions consist of:

- Our integrated tower solution that includes the proven A3000 level 3 A-SMGCS;
- A complete solution for Airport Collaborative Decision Making (A-CDM) that enhances the efficiency of airport operations for all parties involved.

For more information on what we can do for you, visit our website www.hitt traffic.com

From the Desk of the General Secretary CNS Officers' Guild



Subit Kobiraj

It gives me immense pleasure to pen these few lines on this historical event of the IFATSEA General Assembly for the first time in India. ATSEPs from 38 countries have assembled in this cosmopolitan Capital city of India, New Delhi for mutual exchange of information and to discuss and decide on the various important issues of their profession.

In 2010, when I had attended the 40th IFATSEA General Assembly in Paris, I was surprised to see the ATSEPs from more than 40 countries assemble for 5 days to discuss and decide on vital issues of their profession. While attending the various sessions and presentations, where I also could speak on behalf of the Indian affiliates, I found this Annual event meaningful and felt that it was very much required to be brought to India, for the benefits of both, the ATSEPs of India and the participating countries. I immediately proposed for hosting the IFATSEA General Assembly 2012 in India. I was quite surprised at the response and support from other member countries in the Assembly.

Back home, I submitted my report to my team, AAI management and the Ministry of Civil Aviation. The enthusiasm and support which they extended gave me all the impetus needed to set the ball rolling.

It has always been our endeavor to share information among our member. Events such as these enrich our knowledge by sharing information among the aviation community.

We have traverses the last one year with different challenges. But I must admit that due to the full dedication of my team, their hard work and support we have finally been able to organize the 42nd IFATSEA General Assembly in India.

About CNS Officers' Guild:

CNS Officers' Guild was formed in 2005 when some dedicated ATSEPs decided to form their own cadre based association for the better interest of the community. It was a long and hard struggle to bring this association to its present glory and recognition. From that point of time till date we have grown leaps and bounds. We are the voice of the ATSEPs in India. **We represent the Indian ATSEPs in the global aviation community.**

The CNS Officers' Guild is a professional body, which is representing CNS engineers and executives of Airports Authority of India who are responsible for Planning, Procurement, Installation, Maintenance and operation of Communication, Navigational, Surveillance and ATM automation facilities at Indian airports and airspace providing safe and efficient Air Traffic Services. CNS Officers' Guild will continue to contribute its services to Indian and the global aviation community.

In addition to the routine activities of the association, we have been able to organize two major international seminars - **CNS INDIA 2007** on "Emerging trends in the Communication, Navigation & Surveillance in Civil Aviation" and **CNS INDIA 2010** on the "Next Generation Air Traffic Engineering Systems". 2012 is the year for our 42nd IFATSEA General Assembly.

Airports Authority of India - the organization we work for :

India is the one of the fastest growing country in the aviation sector. It has immense potential to prove that Indian sky is a safe haven for the airlines.

Airports Authority of India manages 125 airports, which include 11 International Airport, 08 Customs Airports, 81 Domestic Airports and 27 Civil Enclaves at Defence airfields. AAI has been bestowed with the responsibility of managing the entire Indian airspace measuring about 2.8 million nautical square miles covering the Bay of Bengal and the Arabian Sea.

Airports Authority of India's air navigation services is leaving no cloud unturned in creating seamless sky, backed by skilled manpower, state-of-the-art technology, periodically and continually improved process and procedures, to bolster the air space management system, so that the user is utterly delighted by the clear and communication, precise navigation, secure surveillance and effective air traffic management.

The ATSEPs of India sustain 24x7 and 365 days, communication, navigation, surveillance and air traffic management automation facilities to make India airports and airspace safe and reliable.

Word of thanks :

Organizing this General Assembly has been a Herculean task. Without the support from the Ministry of Civil Aviation, Airports Authority of India and IFATSEA Board it would have been impossible to organize this event successfully. On behalf of my council members, I would like to convey my thanks to the Mr. Ajit Singh, Minister of Civil Aviation. Mr K N Srivastava, Secretary, Ministry of Civil Aviation, Mr V P Agrawal, Chairman, Airports Authority of India, Mr Anup Mishra, Director General of Civil Aviation, Mr Y Bhave, Chairman, Airports Economic Regulatory Authority of India, Ministry of Home Affairs, Ministry of External Affairs and Government of the National Capital Territory of Delhi for all their support and cooperation.

I extend my special thanks to Dr. S N A Zaidi, Election Commissioner and Ex-Secretary, Ministry of Civil Aviation for his valued guidance, support and encouragement right from the grassroots.

Our thanks are also to the esteemed Industrial community, the Media and all those who have helped us to organize the event directly or indirectly. Our special thanks goes to all the sponsors who have supported us in organizing this event. We also thank all the speakers for their excellent and highly professional presentations.

Finally, I take this opportunity to thank all my friends, colleagues in IFATSEA Board and AAI for their support in organizing the 42nd IFATSEA General Assembly.

In the end, it will not be out of place to pen a famous Quotation –

"We can not make a system better than its designed-in capabilities no matter how much maintenance we perform. We can only restore to its designed-in level after deterioration has occurred. This definition, then, is more descriptive of the purpose of maintenance and what maintenance is supposed to accomplish for the operator."

Subit Kobiraj

Next Generation of Air Traffic Safety Electronic Personnel and Air Traffic Engineering Systems

Mr Daniel Boulet
President IFATSEA

On behalf of the International Federation of Air Traffic Safety Electronics Associations, (IFATSEA) I would like to congratulate the CNS Officers' Guild for successfully organizing our 42nd General Assembly.

IFATSEA, founded in 1972, has a long history in modernizing CNS/ATM programs. IFATSEA represents more than 20,000 Air Traffic Safety Electronics Personnel (ATSEP) from over 60 ICAO contracting states worldwide. Promotion of high standards and technologies is one of our objectives along with the promotion of a safe, secure and efficient air navigation system.

ICAO, IATA, CANSO and EUROCONTROL are all forecasting a tremendous increases in traffic in the coming decades. Therefore ICAO contracting states in cooperation with all stakeholders must develop programs and regulations to cope with this demand. Some regions are already developing programs to support this growth. Europe has launched SESAR, USA (FAA) has its NextGen program, Japan is initiating the CARATS and other regions/states are developing or adapting their plans. As aviation is a global industry, international cooperation is critical to ensuring an efficient global Air Navigation System. Harmonization is the key element for its success.

IFATSEA's ATSEPs have critical responsibilities ensuring the interoperability, accuracy, integrity and reliability of many ANS systems. Future ANS systems will increase the responsibilities of ATSEPs thru enhanced management of real time operational systems and implementation of System Monitoring and Control functions of existing and new systems like SWIM.

ATSEPs already constitute a trained, tested, and certified workforce and will continue to provide maintenance and technical operation of the ANS future systems (Next/Gen, SESAR and others). With their knowledge of current systems, ATSEPs are best equipped to transition to new systems without adversely impacting the integrity or reliability of existing systems. They can spot compatibility issues prior to the new equipment being brought online. They respond correctly and safely if it becomes necessary to immediately transition from a new system to a legacy system.

Technological advancement and reliability of systems and equipments will change the role of ATSEPs in the future. ATSEPs will spend more time managing the technical operations of CNS/ATM systems/equipments with emphasis on software and network management. The ANS System Monitoring and control positions will be introduced in all ACC worldwide thus requiring more global coordination.

Flight Check Technical Inspectors will continue to verify the CNS equipment but these checks will adapt to new standards and procedures. IFATSEA foresees that more states and ANSP will implement technical certification programs for CNS/ATM systems and equipments. A duty already performs by a large percentage of our ATSEP today.

We expect an increase in the number of ATSEPs maintaining power supplies and meteorological equipment. As traditional "hardware" maintenance decreases "software" maintenance will take greater prominence.

Harmonization and integration of ATM/CNS systems is crucial to a safe and efficient air navigation system. The human element must always be part of the ATM/CNS equation. Experience is as important as knowledge when making decisions or performing activities that may affect ATM/CNS system integrity.

Today, a huge variety of ATSEP licenses and competency programs have yet to be synchronized. The introduction of an ATSEP license, as endorsed by the ICAO 36th Assembly, is certainly the way forward. Many standards are available in the CNS world but very few in the ATM field. In order to achieve global harmonization, more standards must be developed for addressing ATSEP competency and licensing.

The concept of certification of ANS systems, equipments and software is not applied uniformly around the globe. Prior to implementing the new systems (NextGen, SESAR and others) this issue must be addressed properly.

IFATSEA offers it full support to ICAO and all stakeholders to harmonize CNS and ATM systems into a globally integrated ANS. IFATSEA and its ATSEPs are committed to delivering and managing a safe, secure and efficient worldwide ANS technical infrastructure for the benefits of the whole aviation community and travellers.

Together, we will succeed to develop, manage and operate a global, harmonized, integrated and efficient ANS system.

Aviation Infrastructure development- A view from top

Sh. V. P. Agrawal
Chairman, AAI

Civil Aviation in modern times has acquired increased importance and is witnessing tremendous change. **A**irports Authority of India (AAI) is the **'Main Stay & Face of Civil Aviation' in India** responsible for providing Air navigation services and building airport infrastructure across the length and breadth of our country.

India, has witnessed a tremendous growth in air traffic in the last decade close to 20%. With major traffic flows from east & west, India controls international overflying traffic over the land area and major airspace over Bay of Bengal, Arabian Sea and Indian Ocean.

Considerable work for building infrastructure at airports to meet the growing demand has been done; still lot of work is required to be done to meet the expectations of flying public.

To meet the challenge of development and provide world class facilities at airports, Airports Authority of India has taken up several projects so as;

a. To develop airports in a user-friendly way to induce confidence in the travelling public.

b. To ensure highest level of security and safety for Air travellers.

c. To create a world class Airport infrastructure using state of art technology to facilitate passengers.

d. To provide Communication, Navigation and Surveillance infrastructure and develop fuel efficient and seamless air-routes taking into account the satellite based technology as per time frame set by ICAO.

The developments are in line with Mission and Vision of Airports Authority of India of providing seamless transition of aircraft and passenger in a safe and secure environment while maintaining improved standards of service.

Keeping in view the anticipated growth in the Civil Aviation Sector in coming years, AAI has taken various measures for increasing the terminal capacity, runway capacity, apron capacity as well as number of parking bays at more than 60 non –metro airports. With the development of infrastructure at the non-metro airports, airlines have increased their operations to these non metro airports and more international carriers have also commenced

operations to these upgraded non metro international airports. AAI has also taken up the modernization of Kolkata and Chennai airports at approximate cost of 4000 crores.

On technological front AAI is working on modernization of Air Traffic flow and upgradation of the CNS / ATM facilities. AAI has drawn up a road map for upgradation of the CNS / ATM facilities at the Indian airports in line with the recommendations of Official Committees appointed by the Government of India. AAI has implemented PBN, RNP and RNAV at major airports. The roadmap for CNS/ ATM infrastructure includes provision of DVOR, DME, ILS, Tower automation, RADAR, ASMGCS VCCS, DATIS, RCAG, ADS-B and other state of art facilities at the airports to facilitate efficient operations. Some of these facilities have already been deployed and others are in various phases of deployment.

AAI has also embarked upon prestigious GAGAN Project in collaboration with ISRO, Bangalore to provide Satellite based augmentation system in India. The TDS (Technology Demonstration System) stage has been successfully completed and FOP (Final Operation Phase) of the system for commissioning the system is likely to be completed by 2013.The implementation of this project will catapult India to a select group of countries having this technology. GAGAN will provide seamless navigation over Indian Air Space including oceanic region and precision approaches at all Indian airports. This technology will offer designing straight line routes and will reduce dependence on ground equipments. The aircrafts will benefit from the technology in form of efficient guidance in space and landing, saving in flying time, fuel and carbon emissions.

Maintaining a safe and expeditious flow of traffic across Indian airspace is thus a tough task. The task of providing the backbone infrastructure in form of Installation, effective maintenance and almost 100% availability over the entire airspace is huge and being effectively managed by CNS engineers.

Considering the trends, growth forecast and to meet the future challenges in an efficient manner CNS-ATM modernization is an ongoing process. AAI strategic plan envisages shift from voice communication to digital data communication, from ground based navigation to satellite based navigation, i.e. GAGAN - Indian SBAS, modern radar coverage with ADS-B, multi-lateration etc. The implementation of these will put India amongst the elite group of countries having an efficient, strong and robust CNS/ ATM infrastructure consisting of digital data unit, integrated ATM automation network, and SWIM (System Wide Information Management). The Long-Term plan, is to adopt emerging new technology based on the research and development in the industry. The aim being to provide a safe, efficient, cost effective and environment-friendly CNS/ATM infrastructure with "**collaborative and coordinated global approach**" to ensure harmonization and adoption of the technological solutions that would be cost-effective and uniform, ultimately to be part of the future global Air navigation plan.

AAI is proud to contribute towards redrawing aviation roadmap by placing requisite infrastructure both on ground and in airspace. AAI has taken an integrated approach for development of civil aviation infrastructure in the country by generating synergy between various partners.

In line with global trends to provide modern infrastructure and CNS/ATM services, AAI has been progressing with its plans and has geared up to meet the challenges in the civil aviation sector.

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- ADS-B Stations
- Air Traffic Flow Management System

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ANSP Performance Measurement

V. Somasundaram
Member (ANS)

"Measure to manage" is a key requirement for any business or industry in identifying areas for improvement and setting performance-based targets.

For air navigation services organizations, maintaining and improving safety is paramount. Air navigation services should also provide value to aircraft operators and be reliable and affordable. Service should be provided in the most cost-effective manner possible without compromising safety.

In order to facilitate the design, implementation, and operation of an integrated and collaborative CNS/ATM system to meet the exponential growth of traffic safely and efficiently, it is necessary that performance measurement and management systems are implemented by ANSPs. Improved transparency of ANS performance and the visibility of performance of others, promotes understanding of what drives good performance. Further, it will support improved decision-making and facilitate target-setting. Performance and productivity are the most important management tools for Air Navigation Service Providers. ANSPs employ considerable resources and performance shortfalls can result in significant additional costs to the ANSP, users and society as a whole. Hence, the objective of measuring performance and productivity is to improve performance and minimize cost.

ICAO Doc 9161, Manual on Air Navigation Services Economics & ICAO Doc 9883, Manual on Global Performance of the Air Navigation System)encourage its member States to adopt a Performance Based approach to the provision of Air Navigation Service). The Performance Based approach is a decision- making method based on 3 principles:-

a) Strong focus on desires/results

b) Informed decision-making driven by those results

c) Reliance on facts and data for decision making

ICAO encourages ANSPs to define performance objectives in 11 Key Performance Areas (KPAs) namely, safety, security, environmental impact, cost-effectiveness, capacity, flight efficiency, flexibility, predictability, access/equity, collaboration and inter-operability, which are defined in Doc 9854 (Global Air Traffic Management Operational concept).

Key element in achieving such a Performance Based approach is the definition of a framework for measurement of performance and reviewing various aspects of performance.

An ANSP developing performance metrics may use a five-part system: selecting the most important goals, establishing a measurement method, setting targets, determining what or initiatives are needed to achieve those goals, and then assessing the results of the work and its impact on achieving the goals.

Performance Metrics:

Some of the key performance metrics for measuring the performance of an ANSP are as follows:

Safety – Safety is the highest priority in aviation, and ATM plays an important part in ensuring overall aviation safety. Uniform safety standards and risk and safety management practices should be applied systematically to the air navigation system. It may be useful to develop safety metrics such as violations of ATC separation standards, runway incursions, CNS failures, etc.

Cost Effectiveness – The air navigation system should be cost effective, while balancing the varied interests of the ATM community. The cost of service to airspace users should always be considered when evaluating any proposal to improve ATM service quality or performance. ICAO guidelines regarding user charge policies and principles should be followed .Cost effective metrics indicates the monetary cost of an input required to produce the output. The most appropriate way of measuring cost-effectiveness is measure the ratio of an output measure (a measure of the service provided to the user) to an input measure (cost).An example is the total ANS cost per flight.

Flight efficiency –Efficiency addresses the operational and economic cost effectiveness of gate-to-gate flight operations from a single-flight perspective .Deviation from optimal trajectories generate additional costs, fuel burn and flight time, thus having strong economic, environmental and impact on passengers. Flight efficiency is expressed as the extent to which an aircraft actual route conforms to the requested optimum flight route.

Potential measures of efficiency include the number and/or the percentage of: vertical deviations from the requested/optimum flight level and horizontal deviations from requested/ optimum route.

Availability

Disruptions to key components of CNS/ATM systems can reduce system capacity causing delays, flight diversions and cancellations. "Availability" metrics should indicate the frequency or likelihood that CNS systems crucial to providing total system capacity are operative. Given that satisfactory operation of CNS systems is the norm, statistics on

availability frequently focus on system failures. Either absolute amounts or rates can be used. For example, the number of failures and length of time CNS equipment such as navigation aids, radar or transponder receivers is out of service are absolute measures related to availability. Alternatively, rates of availability can be constructed such as the percentage of time that equipment is operating satisfactory.

Other useful statistics are the average duration of satisfactory equipment operation before failure, or average time to restore service.

Applications of Performance Measurement: –

The use of performance metrics is valuable to air navigation services providers in improving the performance of their ANS systems and controlling costs while maximizing safety.

Measuring performance and productivity can be used internally as a tool for managers to improve the operations of the air navigation services entity. By selecting a critical number of measurable goals that define success for that organization, managers can track the progress of attaining defined objectives.

Performance metrics can be used to define a benchmark from which to compare the quantity or quality of different services provided. Establishing a benchmark provides air navigation services providers the opportunity to measure performance levels against an organization's own Standards as well as others.

Best practices are useful in understanding how to improve performance. Through the use of benchmarking, it is possible to identify highly efficient or high-quality service facilities and/or processes. These performance drivers can then be studied to identify attributes and best practices to be emulated or adopted in other facilities to improve performance.

Performance results can be used to forecast and justify needed capital and staff investments to meet near term and long-term demand.

Performance metrics provide records to demonstrate the quantity and quality of services provided to aircraft operators and the cost-effectiveness of these services.

Improving performance metrics demonstrate the proficiency of air navigation services managers. A declining metric defines an area for action to improve service. Metrics assist in justifying potential new investment and associated costs to users.

The publication of performance metrics for users and the general public is a valuable gauge of the effectiveness and efficiency of an air traffic management system. Dissemination of performance information can build public confidence in the air navigation services provider. The provider's accountability for performance results would also lead to significant improvements in the provision of services contributing to enhanced Safety, Efficiency and cost-effectiveness of aircraft operations.

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GAGAN
Redefining Navigation

GPS Aided GEO Augmented Navigation (GAGAN) *is a planned implementation of Satellite Based Navigation System being developed by India to deploy and certify an operational Space Based Augmentation System (SBAS) for Indian Flight Information Region (FIR), with expansion capability to neighboring FIRs.*

GAGAN has established the capability of meeting International Civil Aviation Organization (ICAO) Standards and Recommended Practices (SARPs) requirements through its Technology Demonstration Phase (TDS) phase. Further India has embarked on a four years Final Operations Phase (FOP) ending June 2013 to provide GAGAN SBAS services over Indian Airspace.

Global Navigation Satellite Systems (GNSS) provide autonomous geo-spatial positioning with global coverage. They allow electronic receivers to determine their location (longitude, latitude, and height) using the signals transmitted by the GNSS satellites. There are four main GNSS systems in different stages of development. The United States NAVSTAR Global Positioning System (GPS) is currently the only fully operational GNSS. The Russian GLONASS is in the process of being restored to full operation. The European Union's Galileo positioning system is a next generation GNSS in the initial deployment phase. China is building up a global system called COMPASS.

GPS is very popular and is supporting a large number of general navigation and timing applications. However, the GPS system lacks the accuracy, integrity, and availability to satisfy the more safety critical applications like Air Transport. This has led to the development of techniques to augment the basic GPS service. Augmentation is a method of improving the navigation system's attributes, such as integrity, accuracy, reliability, and availability, through the integration of external information into the calculation process. There are three different types of Augmentation Systems available depending on the way the corrections are computed and sent to the users namely the Ground Based Augmentation System (GBAS), the Aircraft Based Augmentation System (ABAS), and the Space Based Augmentation System (SBAS).

SBAS is defined as a wide coverage augmentation system in which the user receives augmentation information from a satellite-based transmitter. This system uses ground reference stations spread across a wide area and provides signals from satellites to support high availability operations from en route through to precision approach over a large geographic area. SBAS Reference Stations are deployed throughout the region of service at pre-surveyed locations to measure pseudo ranges and carrier phases on GNSS Signals from all visible satellites. The reference stations send these measurements to SBAS Master Control Station, which calculate clock and ephemeris corrections for each GPS satellite monitored, ephemeris information for each GEO, and Ionosphere grid points (IGPs). In addition to the corrections, the Master Station calculate error bounds for Ionosphere corrections called grid Ionosphere vertical errors (GIVEs) at each IGP , and also combined error bounds for clock and ephemeris corrections for each visible satellite, called user differential range errors (UDREs). The Master station sends these corrections and error bounds to the users through GEO communication satellites. User avionics apply these corrections to their pseudo ranges obtained from GPS measurements, in order to improve the accuracy of their position estimates. They also use the UDREs and GIVEs and other information to calculate error bounds on position error called the Vertical Protection Level (VPL) and Horizontal Protection Level (HPL).

Currently only 4 SBAS systems are in different stages of development. The USA is the first country to develop an SBAS system called Wide Area Augmentation System (WAAS). The European Union is developing European Geostationary Navigation Overlay System (EGNOS). The Japanese system is called Multifunctional Transport Satellite System (MTSAT) Satellite Augmentation System (MSAT). India is developing GPS Aided Geo Augmented Navigation (GAGAN).

GAGAN PROJECT

GAGAN is a planned implementation of a Satellite Based Navigation System being developed by Airports Authority of India (AAI) and Indian Space Research Organization (ISRO) to deploy and certify an operational SBAS for the Indian Flight Information Region (FIR) with expansion capability to neighbouring FIRs. When commissioned for service, GAGAN will provide a civil aeronautical navigation signal consistent with International Civil Aviation Organization (ICAO) Standards and Recommended Practices (SARPS) as established by the Global Navigation Satellite System panel (GNSSP). India is working towards attaining APV1 / APV 1.5 capability over the entire land mass. As the footprint of the GAGAN space segment covers large portion of the Asia-Pacific region i.e., the whole of Indian region and neighboring countries such as Srilanka, Pakistan, Afghanistan, Bhutan, Nepal and Bangladesh, all can derive benefit of the Indian experience to provide SBAS services by appropriately augmenting ground segments.

GAGAN Project was conceived in the year 2001 and planned in two phases: Phase I: Technology Demonstration System (TDS) and Phase II: Final Operation Phase (FOP).

GAGAN TDS PHASE

TDS phase was undertaken to demonstrate and establish India's technological capability to augment GPS data. TDS phase was successfully completed in August 2007. TDS phase required implementation of a minimum configuration system to demonstrate the capability of the SBAS over limited region of the Indian airspace to serve as proof of concept. The performance

objective was to meet the limited ICAO SARPs requirements. The TDS consisted of eight Indian Reference Stations (INRES) at Delhi, Kolkata, Guwahati, Port Blair, Ahmadabad, Bangalore, Jammu and Trivandrum, an Indian Master Control Center (INMCC) at Bangalore, Indian Land Uplink System (INLUS) at Bangalore, required communication links and necessary software for navigation and communication during the TDS phase. By hiring and integrating the INMARSAT 4F1 navigation transponder (space segment) the user level testing of GAGAN signal in space (SIS) was conducted in May-2007. Results were better than 7.6 meters accuracies in both vertical and horizontal over 95% of the time within the perimeter of the reference stations. Several experiments were conducted with the SIS including the verification of the accuracy with certified airborne SBAS receiver.

GAGAN FINAL OPERATION PHASE

The GAGAN Final Operation Phase (FOP) is deployed in a spiral deployment methodology, building incrementally on the TDS phase equipment and architecture, using lessons learned, and data generated from TDS phase to meet the set objective of providing enroute, non-precision approach and precision approach service over the designated service volume.

The ground based elements (GBE) of the GAGAN-FOP will consist of all subsystems established in TDS phase and additional 7 INRES stations established at Bhubaneshwar, Dibrugarh, Gaya, Goa, Jaisalmer, Nagpur and Porbandar; second INMCC at Bangalore; and two more INLUS stations – one at Bangalore and the other at Delhi. The communication links are planned to have redundancies in terms of 2 OFC links and 2 VSAT links between the GAGAN ground elements, to provide the required availability of 99.999%.

The GAGAN FOP is expected to achieve two milestones:

- The first milestone is to achieve an RNP0.1 capability provided over the Indian FIR as specified in the ICAO specification.

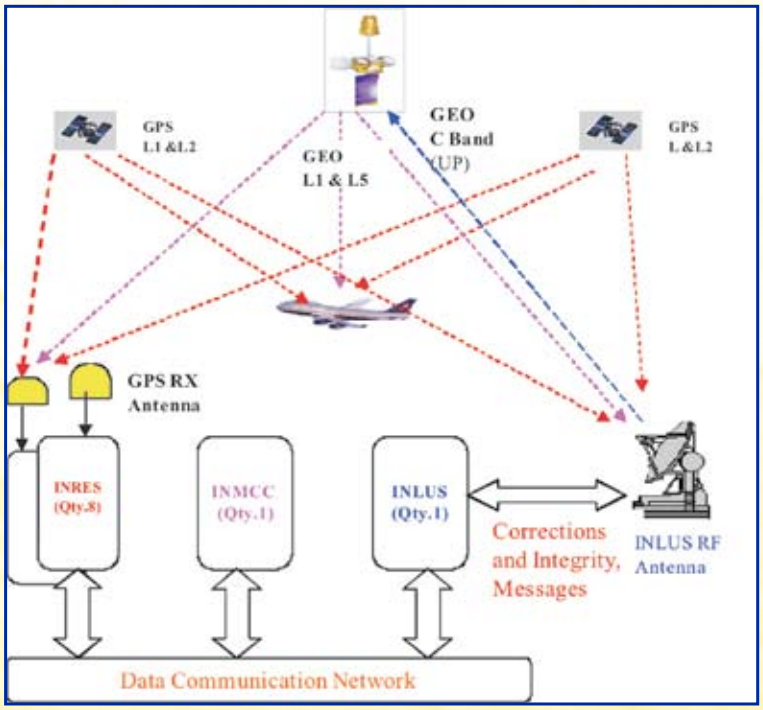

Figure 1: GAGAN TDS Architecture

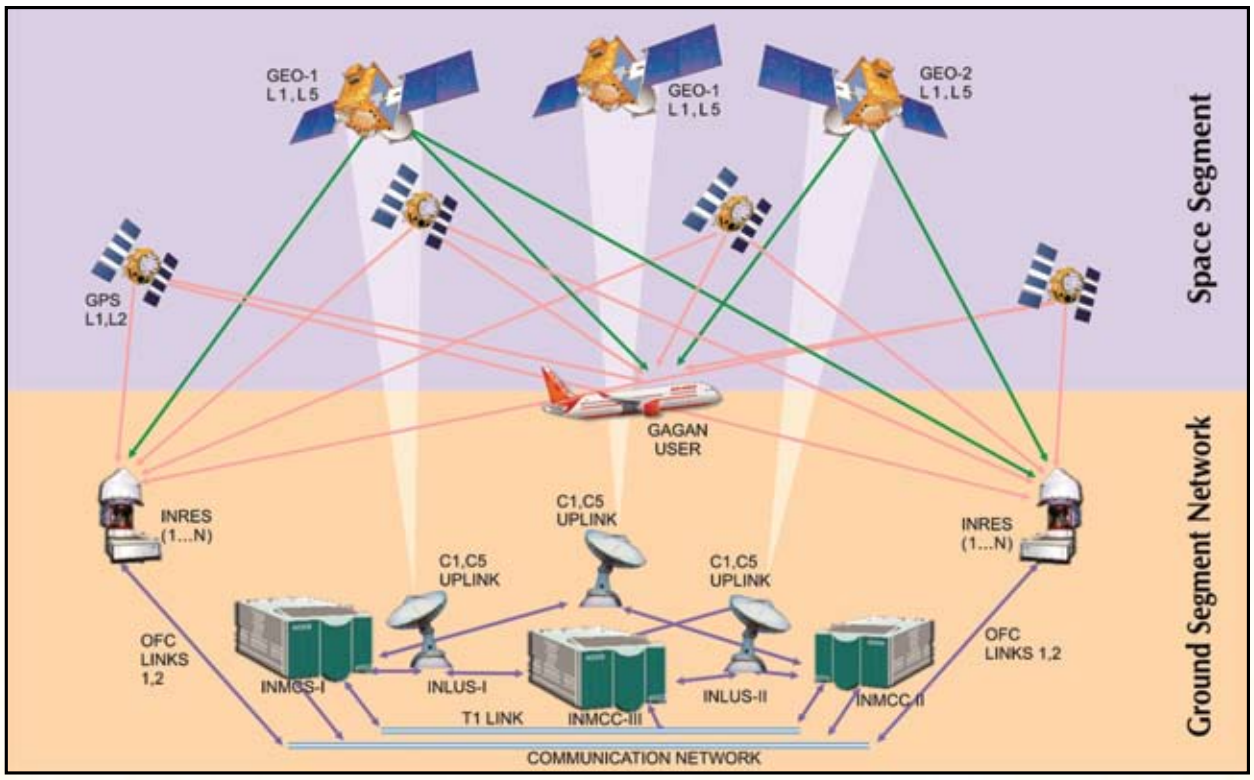

Figure 2: GAGAN FOP Architecture

- The second milestone is to achieve APV1 /APV 1.5 precision approach service as specified in the ICAO specification over 90% of the Indian land mass.

The GAGAN service volume, being at lower latitudes, is susceptible to the ionospheric variations that are very predominant and affect the GPS as well GEO signals. The conventional Single shell ionosphere model used in other SBAS systems falls apart when the ionosphere exhibits sudden changes in electron content as in the case over the equatorial region. Hence to meet the set objective of achieving APV1.0/1.5 precision approach service over the Indian land mass, for GAGAN-FOP, an appropriate region specific ionosphere model called ISRO GIVE Model - Multi Layer Data Fusion (IGM-MLDF) has been developed and implemented by ISRO/AAI. Another important feature of this algorithm is that, it does not require any changes in the user message structure, resulting in ease of GAGAN message usage by all the users, including the legacy users.

Almost all Ground Segments have been installed, tested and integrated with Indian GEO satellite GSAT-8. The Final System Acceptance Test (FSAT) of GAGAN FOP has been successfully completed. The FSAT demonstrated end-to-end broadcast message capability through the GEO, accuracy performance, service level availability, integrity performance and time to alarm over one continuous day.

The system with its entire space segment of three GEOs (GSAT 8, GSAT10 and GSAT 9), ground segments, and uplink stations shall be ready by July 2013. Although the GAGAN signal-in-space is currently available for non-aviation users, the certified GAGAN signal-in-space for aviation users within the defined service volume

will be available with availability of the entire system including appropriate redundancies and safety assurance mechanisms by July 2013.

GAGAN APPLICATIONS

The GAGAN system will revolutionise navigation in India, be it by land, sea or air. However this is just the beginning, with such a dynamic program remarkable transformations can be brought about in sectors like Land & Resource Management – which will aid in forest measurement, town planning and fleet movement.

India being an agricultural country, GAGAN will greatly benefit this sector with precise farming techniques. GAGAN can also be put to good use during search and rescue operations. The scientific community can put this system to good use for surveys, geographical mapping, atmospheric studies, and geodynamic studies.

The advantages and benefits of GAGAN are abundant and with the implementation of this system India will be on the global radar of every harbor, land strip and airport.

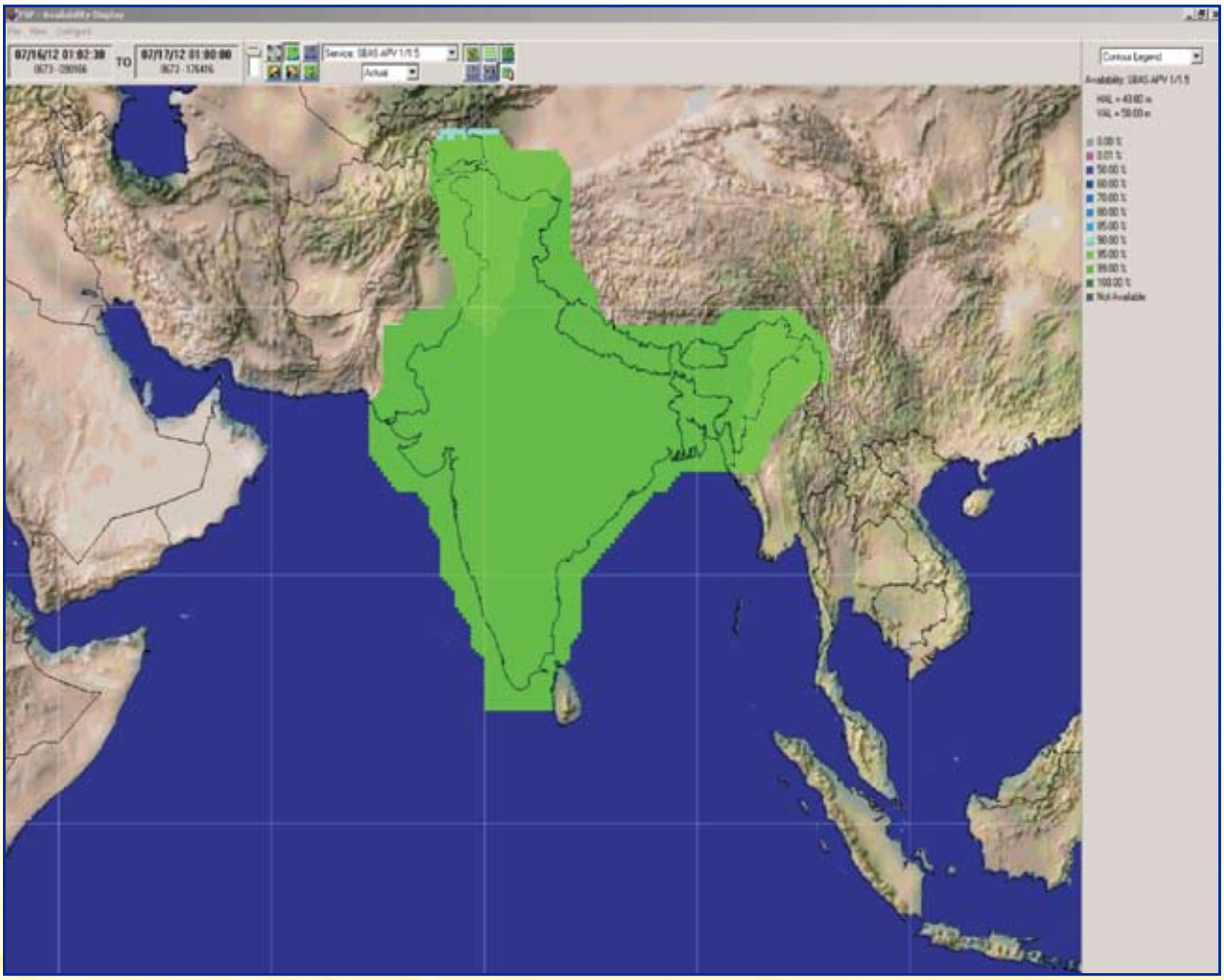

Figure 3: GAGAN APV 1/1.5 Service Availability Chart on FSAT Day

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102 m

21
Controller Positions at Visual Control Room

12
Ground Controller Positions at Operational Level

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NextGEN Implementation Plan

Executive Summary

The NextGen Implementation Plan provides an overview of the FAA's ongoing transition to the Next Generation Air Transportation System (NextGen), which is improving the way things work in our nation's skies and at our nation's airports.

NextGen integrates new and existing technologies, policies and procedures to reduce delays, save fuel and lower aircraft exhaust emissions to deliver a more reliable travel experience. The NextGen Implementation Plan provides a summary overview of the benefits operators and passengers are experiencing from recent NextGen improvements; it also highlights future benefits that will result from additional NextGen implementations, and provides insight into how we are working together with the aviation community to achieve NextGen success.

While the thrust of our work focuses on U.S. airports, airspace and aircraft, the FAA actively engages with global aviation partners to ensure operators receive benefits anywhere in the world.

NextGEN TODAY

The year 2011 was a busy one for NextGen, particularly for our continued deployment of the Automatic Dependent Surveillance–Broadcast (ADS-B) ground-based infrastructure. More than 300 ground stations were operational by the end of 2011, providing satellite-based surveillance coverage of the East, West and Gulf coasts and most of the area near the U.S. border with Canada. We expect the total complement of about 700 radio stations to be in place and operating by early 2014.

As promised, we also published a significant volume of arrival and departure procedures in addition to high- and low-altitude routes. These new Performance Based Navigation (PBN) procedures are designed to provide greater flexibility in the National Airspace System (NAS) and to facilitate more dynamic management of air traffic. Additionally, we developed a process that reduces the time it takes to introduce PBN procedures.

We significantly improved access to general aviation airports through PBN approach procedures known as Area Navigation Wide Area Augmentation System (WAAS) Localizer Performance with Vertical Guidance (LPV) procedures. We published 354 WAAS LPVs in Fiscal Year 2011. As of February 2012, there were more than 2,800 LPVs at nearly 1,400 airports throughout the United States.

Additionally, we advanced to the design phase of our metroplex initiative in two locations. Under this initiative, study groups identify near-term PBN improvements and minor airspace adjustments that can be completed in major metropolitan areas within three years. Following studies at Washington, D.C., and north Texas in

2010, we began design activities in these areas in 2011. We also completed studies in 2011 for northern California, southern California, Houston, Atlanta and Charlotte, N.C., and we are now preparing for design work in those locations.

Our ongoing advocacy of sustainable jet fuels through the Commercial Aviation Alternative Fuels Initiative reached a significant milestone on July 1, 2011. Standards-setting organization ASTM International approved the use of a renewable, bio-derived jet fuel.

NextGEN BENEFITS

NextGen will provide a number of benefits for NAS users, our environment and our economy.

We estimate that NextGen improvements will reduce delays 38 percent by 2020, compared with what would happen if we did not implement planned NextGen improvements. These delay reductions will provide an estimated $24 billion in cumulative benefits through 2020. NextGen delay reductions are in addition to any reduction from future runway construction or expansion.

We estimate 14 million metric tons in cumulative reductions of carbon dioxide emissions through 2020. For the same period, we estimate 1.4 billion gallons in cumulative reductions of fuel use.

To achieve timely NextGen benefits, the FAA needs to synchronize its investments with those of aviation stakeholders. To encourage operator equipage and validate concepts, the FAA conducts simulations, demonstrations, trials and flight evaluations as part of developing NextGen systems and procedures.

OPERATIONAL VISION

The FAA's mid-term operational vision remains unchanged and includes fundamental improvements at every phase of flight. Common weather and system status information will dramatically improve flight planning. Advances, such as ADS-B and Data Communications (Data Comm), combined with PBN, will increase safety and capacity, save time and fuel, decrease aircraft exhaust emissions and improve our ability to address noise.

With NextGen, we continue to advance safety as we look to increase air traffic and accommodate unmanned aircraft systems and commercial space flights. To minimize risk as we bring together a wave of new NextGen capabilities during the next decade, the aviation community relies on integrated safety cases and other proactive forms of management that allow us to assess the risk of proposed changes. Policies, procedures and systems on the ground and on the flight deck enable the mid-term system. We enhance technologies and procedures that are in use today, as we introduce innovations that will fundamentally change air traffic automation, surveillance, communications, navigation and the way we manage information.

In addition to the advances we develop through NextGen transformational programs and implementation portfolios, the mid-term system depends on coordination across FAA lines of business, including specialists on safety, airports, the environment, policy development and air traffic management. FAA information and management systems must keep these activities synchronized as we approach the mid-term, reach it and move forward. We use a strategic Environmental Management System approach to integrate environmental and energy objectives into the planning, decision making and operation of NextGen.

RESPONSE TO NEXTGEN AD VISORY COMMITTE RECOM-MENDAT IONS

At the FAA's request, the RTCA launched the NextGen Advisory Committee (NAC) in summer

2010 to solicit recommendations on issues critical to NextGen's successful implementation. Early in 2011, top-level aviation executives began analyzing equipage and related incentives, trajectory operations, airspace and procedures, metrics and integrated capabilities. On Sept. 29, 2011, the NAC approved the recommendations its work groups devised and then submitted the suggestions to the FAA. Crossagency teams formulated responses and action plans, which FAA executive management approved. We summarize the NAC recommendations and the FAA responses in the Plan.

NEXTGEN AHEAD

Over the next several years, we will build on existing NextGen technologies and procedures to offer additional capabilities in the NAS.

Forthcoming improvements include expanded surface datasharing capabilities (and corresponding policies) to enhance surface safety and foster collaborative air traffic management. We are also developing procedures to enable more efficient use of closely spaced parallel runways to improve airport throughput, particularly during poor visibility conditions.

During the 2013-2015 timeframe, we plan to develop and implement mechanisms to provide NAS users with information about the current and future status of Special Activity Airspace (airspace set aside for military training and other specialized use), enabling more efficient flight planning.

We are also capitalizing on the precise surveillance of ADS-B to introduce a new capability that will enable controllers to better sequence arrival traffic from greater distances, improving the predictability and efficiency of traffic flow into busy airports. We will also leverage ADS-B to track the location of properly equipped ground vehicles on the airport surface.

Data Comm will enable a supplemental means for two-way exchange of information between controllers and flight crews. We are on track for a final investment decision this year for the VHF radio network that will carry Data Comm messages. An initial tower capability for revised departure clearances is expected in 2015.

CHALLENGES

Even in the face of new challenges, the FAA remains confident about NextGen success. Given our history of overcoming difficulties, we are prepared to respond to any new obstacles.

Uncertainties and constraints increase the importance of managing NextGen with the skill and determination that such a complex system engineering project requires. We are making considerable progress on challenges that are malleable to management solutions. In 2011, the FAA reorganized the office responsible for carrying out NextGen implementation under an initiative called Foundation for Success, providing a more effective organizational and management structure for ensuring the timely, cost-effective delivery of NextGen. The head of NextGen now reports to the deputy administrator of the FAA, increasing NextGen's visibility within and outside the agency.

WHY NextGEN MATTERS

NextGen benefits everyone from frequent flyers to those who rarely travel by air. NextGen will provide a better travel experience, with fewer delays, more predictable trips and the highest level of safety. Many people who live in neighborhoods near airports will experience less aircraft noise and fewer emissions. Communities will make better use of their airports, strengthening their local economy. Our nation's economic health depends on a vital aviation industry.

SESAR Project
Shaping the future of Air Traffic Control

Carlos Viegas
IFATSEA - SESAR SJU Liason

The way air traffic control has been done and in reality still is, evolved from basic principles and systems that came into being as aircraft themselves were assumingthe initial steps towards a reliable means of transport.

WW1 and WW2 brought about huge steps ahead in technology. Communicating with aircraft and detecting and controlling them became a necessity for military reasons initially either to detect enemy attacks or to communicate with squadrons and personnel transports.

Issues of safety and economics were very secondary issues to be dealt with as other more relevant ones were at stake.

With the end of these conflicts, civil air traffic grew exponentially and all the technological developments brought about for military reasons could now be used to support the organizing of traffic of aircraft on a global scale.

A two-horn system at Bolling Field, USA, in 1921

The Chicago convention (7 december 1944) through ICAO brought a global order and a clear way ahead for the civil air traffic industry.

The model grew to it's full potential and was refined time and time again but was clearly outpaced by the huge growth of air traffic, and huge running costs for the airlines. Although that had not been an issue in the early years it now became the driving reason for all change.

The oil crisis was by no means easy to deal with either and a huge effort was made by

aircraft engine manufacturers to develop new and more fuel efficient models is the order of the day.

This paradigm for air traffic control has run it's course, although this is clearer in some parts of the world and less so in others, a new paradigm is needed, routed in a newer set of pre-requisites and the usage of new technologies that require a different approach to realize their full potential, namely the huge computing power available to us today as well as a global network for communications, satellite and ground based.

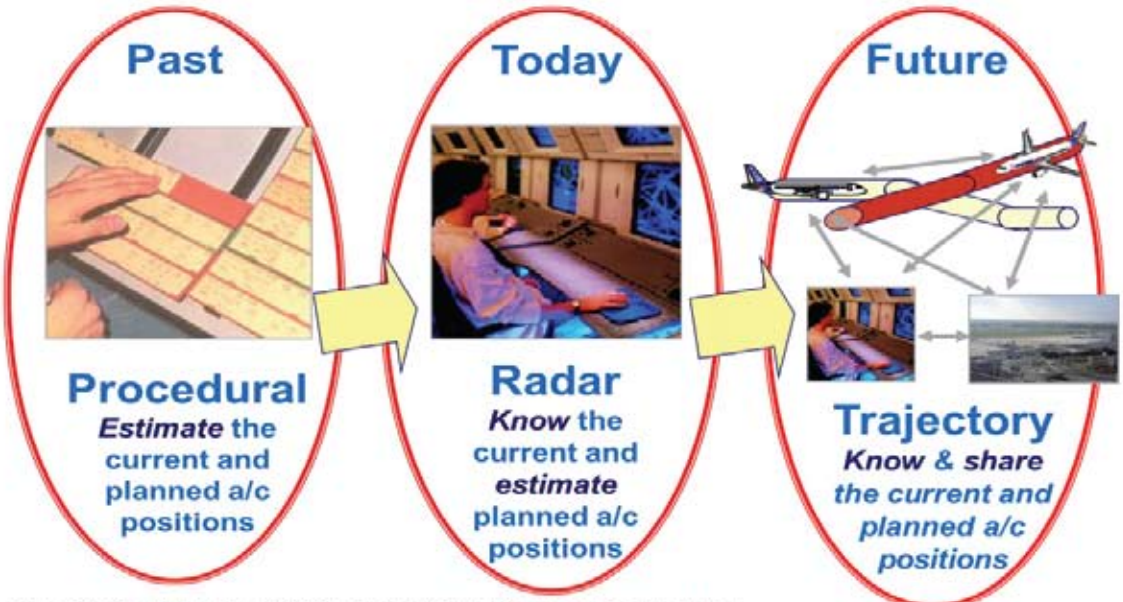
Patching up an old and inadequate concept is no longer viable and does not make economic sense.

Hence projects like SESAR, NEXTGEN, CARATS, GAGAN and others...

The SESAR Project, which was initially conceptualized as SESAME, is the Pan European effort towards changing the paradigm through which the conceptualization of the provision of Air Navigation Services and hence air traffic control will be done in the short and medium term. It was born as a bottom up approach, involving all stakeholders in an effort to have an inherent buy-in from all users and providers from the word go and speeding up the implementation route.

The staff organizations too were invited for detailed involvement from the beginning. IFATSEA was therefore a key player in the introduction of all aspects of the emerging and traditional roles and responsibilities for ATSEP in this new environment during the Definition phase of the project which ended in 2008.

The scope and nature of these new roles and responsibilities was identified and designed at high level during the design phase of the project and is being followed through by IFATSEA with our participation in the SJU (SESAR Joint Undertaking). In this phase of the project the design structure was broken down



From Smiths Aerospace (Briefing) at FAA New Technologies Workshop
9-10 January 2007 Arlington VA

into Work Packages (WP) and individual projects for practical research and implementation, it's very important to note that all findings of this phase of the project are taken in to the European ATM Master Plan.

At this point in time IFATSEA has close to three dozen ATSEP involved at various levels in individual projects and project validation teams. They will identify any issues of strategic relevance for the new paradigm that are most relevant for the safety factors and for the ATSEP in a hugely complex pan European system.

The amount and impact of the changing and new roles and responsibilities for all professional in the industry and more specifically ANS, is huge and more so for ATSEP upon whose shoulders the huge technological leap will rest, in terms of responsibility and operational maintenance and technical network management.

The usual fall back system in failure mode can no longer be up to the human in this environment. As such, the ATSEP role with be at the core of all procedures in fallback modes and systems and the new role of systems health

management and failure prediction will have the ATSEP constantly on the front line of safety factor maintenance for such future systems.

The Functional Air Space Blocks (FAB) in Europe, as the aggregators of various national airspaces highlighted some of these subjects and brought to the forefront issues like the need to change national law to cater for extra national personnel and systems controlling air traffic in national airspaces in a harmonized way.

However the laws for the legal protection of ATSEP and other operational Staff within this new environment are not in place yet or have not been transposed from European regulations into National laws, this situation raises a number of issues which cannot be underestimated. The manner in which we deal with them will reshape the ATSEP profession, now and for the foreseeable future.

It is a whole new world with new opportunities and dangers and requires our best effort for a balanced just and efficient outcome.

The theoretical backbone of the project hinges is the 4D trajectory concept, in which aircraft are mobile network nodes and have their whole profile, including time, contracted down to a few seconds from gate to gate.

This concept implies seamless systems integration, staff capabilities and training, responsibilities and European relevant legislation harmonization.

It will fall to systems, under ATSEP responsibility, to guarantee that aircraft will maintain their 4D trajectories, aircraft will depart separated and de-conflicted by the very nature of the concept. However the interim period will be indeed challenging for all involved, with a mixture of compliant and not yet compliant aircraft and a mixture of the two concepts coexisting.

The perspective for the future of air traffic control is more global than ever and all these projects, SESAR, NEXTGEN, CARATS, GAGAN and other projects in China and Russia all are learning from each other's approach and experience. Cross coordination is essential for interoperability and in fact at the very heart of the different efforts, ATSEP and other operational professionals are heavily involved in this design of the future, cooperate and exchange experiences through research.

Within SESAR we already look long term with the Work Package E(WPE), doing theoretical long term research in the form of Doctorates by the highest level of Professionals from the academic community. These doctorates that are financed by the project have to be focused on an evolutionary thread that maintains a clear vision where we want to go and what the objectives are. Moreover these results will cross fertilize ongoing and forthcoming research in the related domains e.g. Safety in Complex systems.

The requirement for even higher levels of safety for the travelling public and viable and profitable air travel in this challenging economic environment demands the best efforts from all stakeholders. This must be achieved while respecting the human factor in the ANS industry, no easy feat but achievable…after all we have fantastic professionals and a love/devotion for the industry that can make it all possible.

In the end it's all about the Human factor and its unlimited possibilities. It continues to be the key factor for the buy-in in this stepped approach towards the forthcoming Paradigm shift in the ANS industry.

Note: All the above will be expanded, and detailed at the IFATSEA Assembly and in a more detailed version in NAVAIRE.

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ICAO

Aviation System Block Upgrades

The Framework For Global Harmonization

Introduction

The 37th Session of the International Civil Aviation Organization (ICAO) General Assembly (2010) directed the Organization to double its efforts to meet the global needs for airspace interoperability while maintaining its focus on safety. ICAO therefore initiated the "Aviation System Block Upgrades" initiative as a programmatic framework that:

- develops a set of air traffic management (ATM) solutions or upgrades,
- takes advantage of current equipage,
- establishes a transition plan, and
- enables global interoperability.

ICAO estimates that US$ 120 billion will be spent on the transformation of air transportation systems in the next ten years. While NextGen and SESAR in the United States and Europe account for a large share of this spending, parallel initiatives are underway in many areas including the Asia/Pacific, North and Latin America, Russia, Japan and China. Modernization is an enormously complex task but the Industry needs the benefit of these initiatives, as traffic levels continue to rise. It is clear that to safely and efficiently accommodate the increase in air traffic demand—as well as respond to the diverse needs of operators, the environment and other issues—it is necessary to renovate ATM systems, to provide the greatest operational and performance benefits.

Aviation System Block Upgrades comprise a suite of modules, each having the following essential qualities:

- A clearly-defined measurable operational improvement and success metric;
- Necessary equipment and/or systems in aircraft and on ground along, with an operational approval or certification plan;
- Standards and procedures for both airborne and ground systems; and
- A positive business case over a clearly defined period of time.

Modules are organized into flexible and scalable building blocks that can be introduced and implemented in a State or a region depending on the need and level of readiness, while recognizing that all the modules are not required in all airspaces.

The concept of the block upgrades originates from existing near-term implementation plans and initiatives providing benefits in many regions of the world. The Block upgrades are

largely based on operational concepts extracted from the United States' Next Generation Air Transportation System (NextGen), Europe's Single European Sky ATM Research (SESAR) and Japan's Collaborative Actions for Renovation of Air Traffic Systems (CARATS) programmes. Also included was the feedback from several member states, with evolving modernization programmes, received at the recent Global Air Navigation Industry Symposium. It is also aligned with the ICAO Global Air Traffic Management Operational Concept (Doc 9854). The intent is to apply key capabilities and performance improvements, drawn from these programmes, across other regional and local environments with the same level of performance and associated benefits on a global scale.

The Block Upgrades describe a way to apply the concepts defined in the ICAO Global Air Navigation Plan (Doc 9750) with the goal of implementing regional performance improvements. They will include the development of technology roadmaps, to ensure that standards are mature and to facilitate synchronized implementation between air and ground systems and between regions. The ultimate goal is to achieve global interoperability. Safety demands this level of interoperability and harmonization. Safety must be achieved at a reasonable cost with commensurate benefits.

Leveraging upon existing technologies, block upgrades are organized in five-year time increments starting in 2013 through 2028 and beyond. Such a structured approach provides a basis for sound investment strategies and will generate commitment from equipment manufacturers, States and operators/service providers.

The block upgrades initiative will be formalized at the Twelfth Air Navigation Conference, in November 2012. Following which, it will form the basis of the Global Air Navigation Plan (GANP). The Global Air Navigation Industry Symposium, in September 2011, will allowed industry partners as well as States to gain insight, provide feedback and ultimately commit to the initiative.

The development of block upgrades will be realized by the change of focus from top-down planning to more bottom-up and pragmatic implementation actions in the regions. The block upgrades initiative is an instrument that will influence ICAO's work programme in the coming years, specifically in the area of standards development and associated performance improvements.

Stakeholder Roles and Responsibilities

Stakeholders including service providers, regulators, airspace users and manufacturers will be facing increased levels of interaction as new, modernized ATM operations are implemented. The highly integrated nature of capabilities covered by the block upgrades requires a significant level of coordination and cooperation among all stakeholders. Working together is essential for achieving global harmonization and interoperability.

For ICAO and its governing bodies, the block upgrades will enable the development and delivery of necessary Standards and Recommended Practices (SARPs) to States and Industry in a prompt and timely manner to facilitate regulation, technological improvement and ensure operational benefits worldwide. This will be enabled by using the standards roundtable process, which involves ICAO, States and Industry, and various technological roadmaps.

States, operators and Industry will benefit from the availability of SARPs with realistic lead times. This will enable regional regulations to be identified, allowing for the development of adequate action plans and, if needed, investment in new facilities and/or infrastructure.

Different stakeholders worldwide should prepare ATM for the future. The block upgrades initiative should constitute the basis for future plans for ATM modernization. Where plans are in existence, they should be revised in line with objectives defined in the block upgrades.

For the Industry, this constitutes a basis for planning future development and delivering products on the market at the proper target time.

For service providers or operators, block upgrades should serve as a planning tool for resource management, capital investment, training as well as potential reorganization.

What is an Aviation System Block Upgrade?

An Aviation System Block Upgrade designates a set of improvements that can be implemented globally from a defined point in time to enhance the performance of the ATM System. There are four components of a Block upgrade:

Module – A module is a deployable package (performance) or capability. A module will offer an understandable performance benefit, related to a change in operations, supported by procedures, technology, regulation/standards as necessary, and a business case. A module will be also characterized by the operating environment within which it may be applied.

Of some importance is the need for each of the modules to be both flexible and scalable to the point where their application could be managed through any set of regional plans and still realize the intended benefits. The preferential basis for the development of the modules relied on the applications being adjustable to fit many regional needs as an alternative to being made mandated as a one-size-fits-all application. Even so, it is clear that many of the modules developed in the block upgrades will not be necessary to manage the complexity of air traffic management in many parts of the world.

Thread – A series of dependent modules across the block upgrades represent a coherent transition thread in time from basic to more advanced capability and associated performance. The date considered for allocating a module to a block is that of the IOC. A thread describes the evolution of a given capability through the successive block upgrades, from basic to more advanced capability and associated performance, while representing key aspects of the global ATM concept

Block – a block is made up of modules that when combined enable significant improvements and provide access to benefits.

The notion of blocks introduces a form of quantization of the dates in five year intervals. However, detailed descriptions will allow the setting of more accurate implementation dates, often not at the exact reference date of a block upgrade. The purpose is not to indicate when a module implementation must be completed, unless dependencies among modules logically suggest such a completion date.

Performance Improvement Area (PIA) – sets of modules in each Block are grouped to provide operational and performance objectives in relation to the environment to which they apply,

thus forming an executive view of the intended evolution. The PIAs facilitate comparison of ongoing programmes.

The four Performance Improvement Areas are as follows:

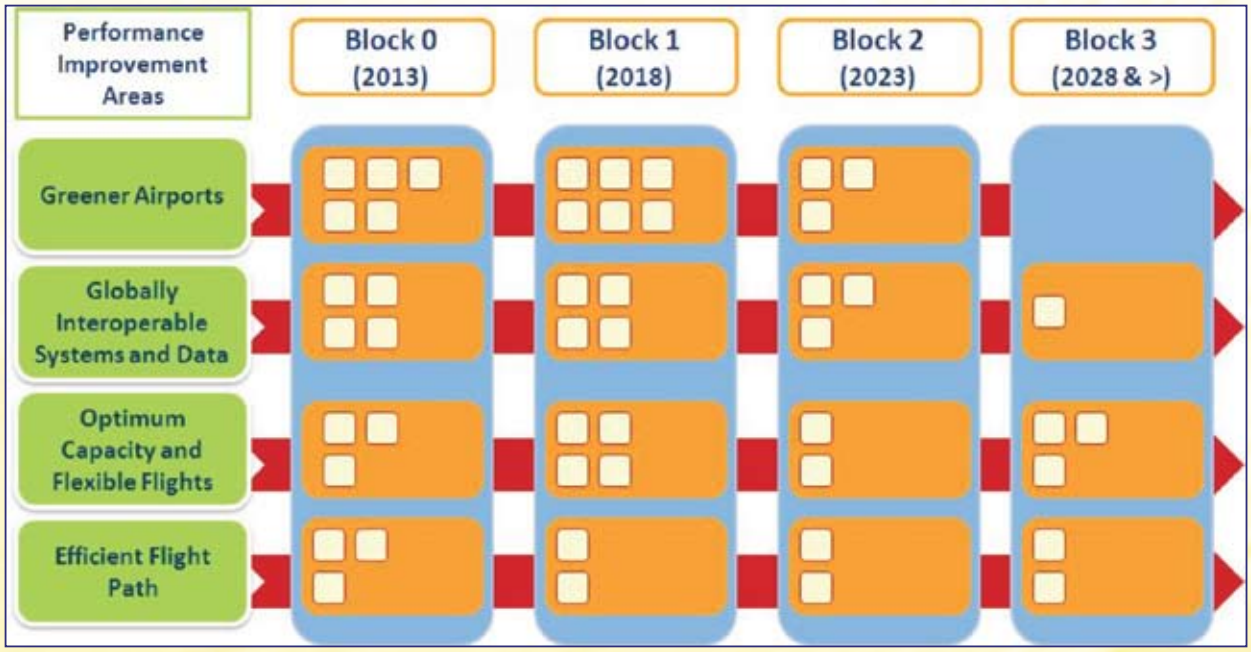
1. Greener Airports
2. Globally Interoperable Systems and Data – through Globally Interoperable System-Wide Information Management
3. Optimum Capacity and Flexible Flights – through Global Collaborative ATM
4. Efficient Flight Path – through Trajectory Based Operations

Table 1 illustrates the relationships between the Modules, Threads, Blocks, and Performance Improvement Areas.

Note that each Block includes a target date reference. Each of the Modules that form the Blocks must meet a readiness review that includes the availability of standards (to include performance standards, approvals, advisory/guidance documents, etc.), avionics, infrastructure, ground automation and other enabling capabilities. In order to provide a community perspective each Module should have been fielded in two regions and include operational approvals and procedures. This allows States wishing to adopt the Blocks to draw on the experiences gained by those already employing those capabilities.

Figure 1 illustrates the timing of each Block relative to each other. Note that early lessons learned are included in preparation for the Initial Operating Capability date. For the Twelfth Air Navigation Conference it is recognized that Blocks 0 and 1 represent the most mature of the Modules. Blocks 1 and 2 provide the necessary vision to ensure that earlier implementations are on the path to the future.

An illustration of the improvements brought by Block 0 for the different phases of flight is presented in Figure 2. It highlights that the proposed improvements apply to all flight phases, well as the network as a whole, information management and infrastructure.



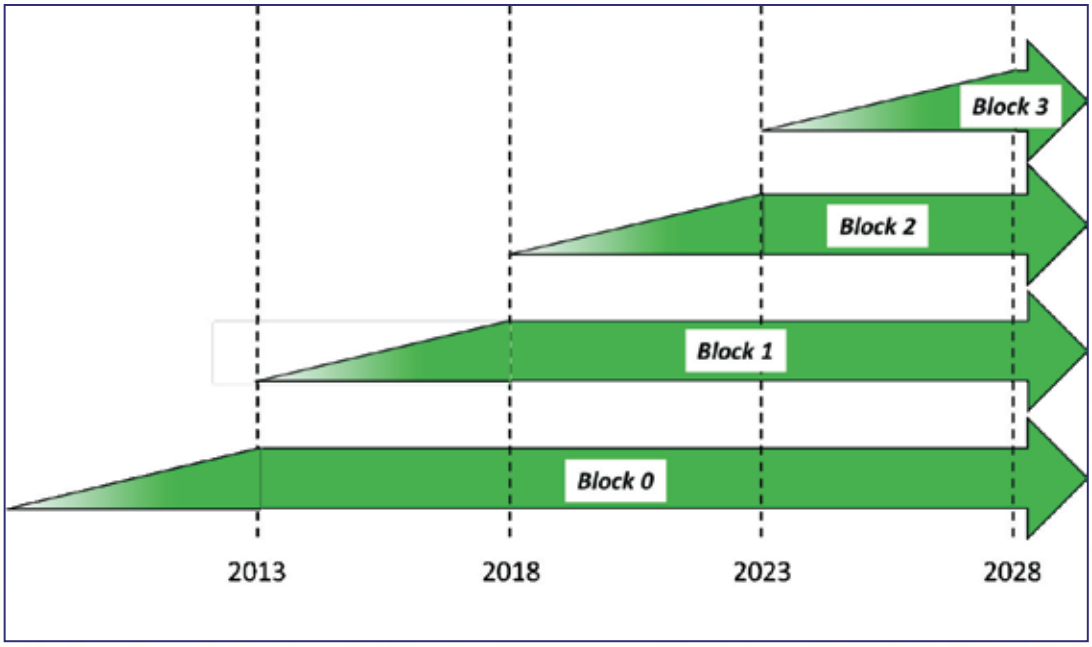


Figure 1. Timing Relationships Between Blocks

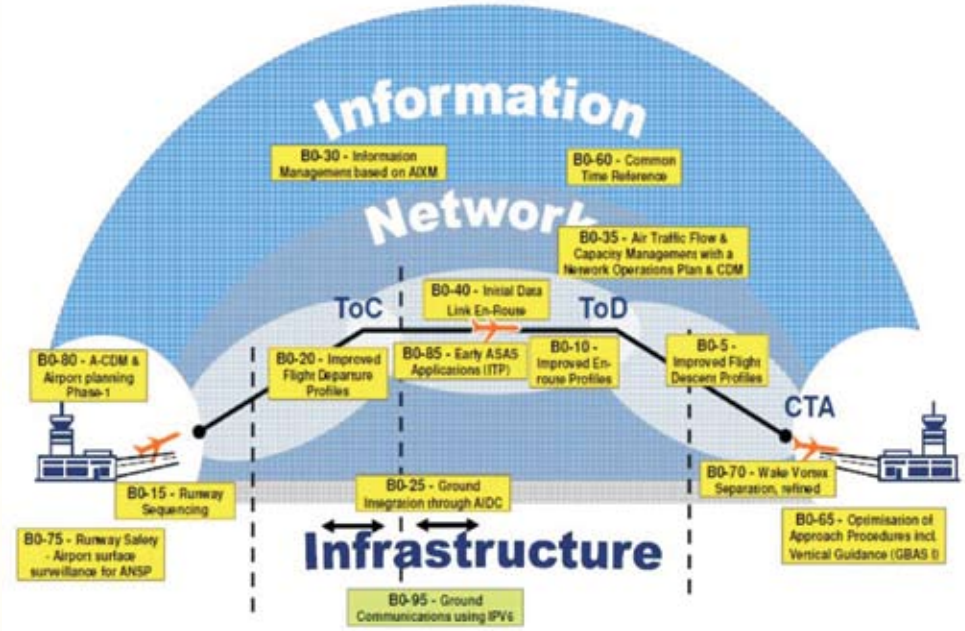
Global Air Navigation Plan

The GANP is a strategic document that has successfully guided the efforts of States, planning and implementation regional groups (PIRGS) and international organizations in enhancing the efficiency of air navigation systems. It contains guidance for systems improvements in the near- and medium-term to support a uniform transition to the global ATM system envisioned in the Global ATM Operational Concept. Long-term initiatives from the operational concept, however, are maturing and the GANP must be updated in order to ensure its relevance and compatibility.

The United States and Europe share a common ATM modernization challenge since both operate highly complex, dense airspaces in support of their national economies. Although quite different in structure, management and control, their systems are built on a safety-focused infrastructure while actively seeking and delivering the required efficiency gains. The United States has a single system that spans the entire country, while Europe's is a patchwork of systems, service providers and airspaces defined mostly by the boundaries of States. Both legacy infrastructures must migrate to a new, upgraded and modernized operational paradigm.

Over the past ten years, as the ATM operational concepts were developed, the need was recognized to:

1) integrate the air and ground parts, including airport operations, by addressing flight trajectories as a whole and sharing accurate information across the ATM system;
2) distribute the decision-making process;
3) address safety risks; and
4) change the role of the human with improved integrated automation. These changes will support new capacity-enhancing operational concepts and enable the sustainable growth of the air transportation system.



ICAO aims for the block upgrades initiative to become the global approach for facilitating interoperability, harmonization, and modernization of air transportation worldwide. As implementation proceeds, the highly integrated nature of the block upgrades will necessitate transparency between all stakeholders to achieve a successful and timely ATM modernization.

The Twelfth Air Navigation Conference provides the rare opportunity to make significant progress and arrive at decisions toward the global coordinated deployment of the block upgrades. The anticipated result of the block upgrades work will represent a new process taking the above factors into account. Following its first application, progress reviews and updates are foreseen at regular intervals.

Conclusion

The Aviation System Global Block Upgrade initiative should constitute the framework for a worldwide agenda towards ATM system modernization. Offering a structure based on expected operational benefits, it should support investment and implementation processes, making a clear relation between the needed technology and operational improvement.

However, block upgrades will only play their intended role if sound and consistent technology roadmaps are developed and validated. As well, all stakeholders involved in the worldwide ATM modernization should accept to align their activities and planning to the related Block upgrades. The challenge of the Twelfth Air Navigation Conference will be to establish a solid and worldwide endorsement of the Aviation System Block Upgrades as well as the related technology roadmaps into the revised Global Air Navigation Plan, under the concept of One Sky.

Note: We express and thanks and gratitude to International Civil Aviation Organization (ICAO) for this Working Document for the Aviation System Block Upgrades THE FRAMEWORK FOR GLOBAL HARMONIZATION. Issued: 16 NOVEMBER 2011

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Civil Aviation Bureau of Japan

INTRODUCTION

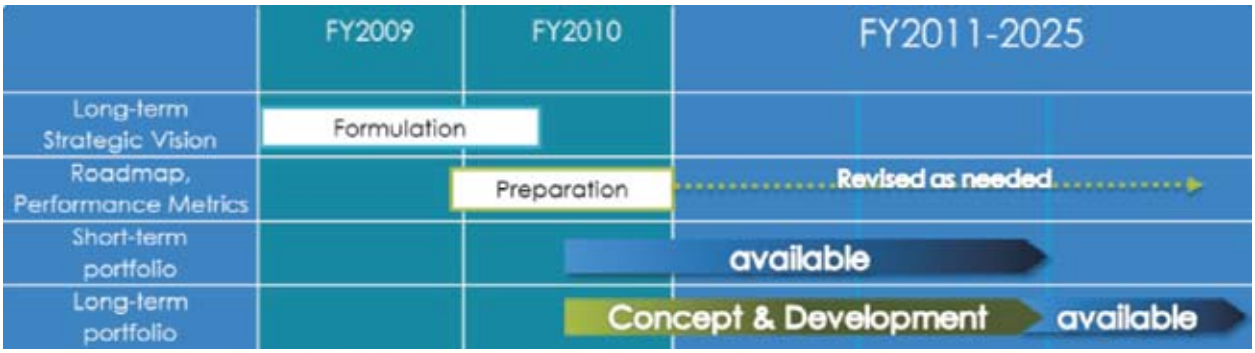
Japan is now facing the harsh realities of population decrease, declining birthrate, and aging population. The environment surrounding the country's international economic and social activities is changing dramatically and becoming more complex: neighboring Asian states are enjoying rapid economic growth, and globalization is progressing. On the other hand, measures to counter global warming are attracting worldwide attention, and Japan is determined to positively address this issue.

With this background, Japan needs to draw up and carry out a growth strategy, capitalizing on its strengths in order to sustain its economic growth and enhance its international position. Aviation service is a fundamental economic and social infrastructure that allows more people and goods to move more freely and efficiently than ever, and supports Japan's growth strategy for economic and social progress and for enhancing the national living standard. It is becoming increasingly important to increase the quantity of domestic and international air service while improving its convenience and environmental friendliness.

To achieve this, in addition to improving the infrastructure, it is necessary to increase the air traffic capacity of congested airports and airspace over the Greater Tokyo Metropolitan Area and other areas, and to ensure efficient flight operations for all possible needs. However, there are various problems with the current air traffic systems such as the concentration of traffic flows in certain airspace and routes arising from partially flexible use of airspace and routes. It is therefore necessary to reform Japan's air traffic systems decisively and strategically for the future.

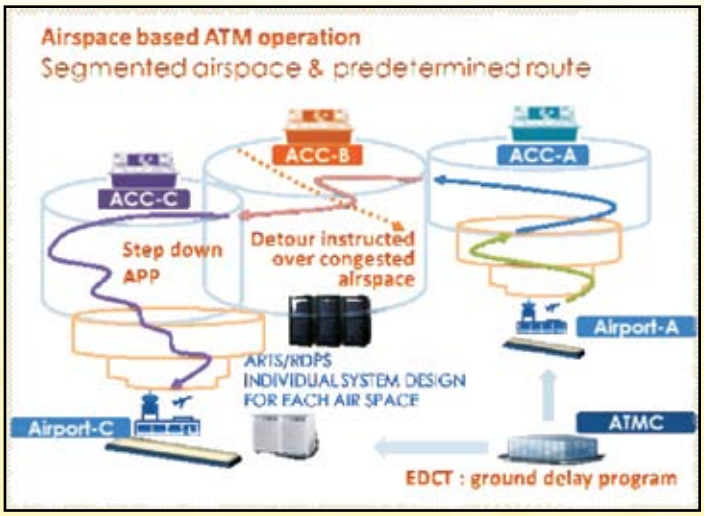
In view of these issues, it was considered necessary to draw up a long-term vision in coordination with parties concerned, taking into account the uniqueness of air traffic in Japan and accurately grasping the needs of users and communities, intentions of operators, and technical trends in the ground systems as well as in the airborne. Therefore, a study group consisting of representatives from industry, academia and government, including academic experts, operators, research institutes and the Civil Aviation Bureau was set up and has been carrying out necessary studies.

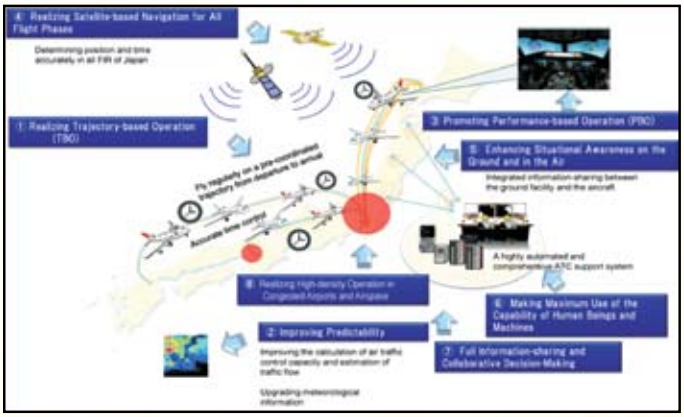
The study group held a number of discussions and considered from various angles



how the air traffic systems should be in future, taking global trends into account, and has finally compiled this "Long-term Vision for the Future Air Traffic Systems," which was named "CARATS: Collaborative Actions for Renovation of Air Traffic Systems" since it requires the following collaborative works with various aviation stakeholders:

a. Collaboration among industry, academia and government
b. Collaboration between operators and Air Navigation Service Provider (ANSP)
c. International collaboration to realize seamless air traffic operations
d. Collaboration among co-users of airspace
e. (Civil, Japan Self-Defense Forces, US Forces)
f. Collaboration with local communities Related





CARATS BENEFITS

CARATS will provide a number of benefits for Japanese airspace users. Flying will be expected quieter, cleaner and more fuel-efficient.

JCAB estimates that CARATS improvements will reduce flight time and fuel consumption by 10%. These will provide a reduction of CO_2 emission by 10%. In addition to these benefits, with delivering operational improvements CARATS will achieve increasing to cope with air traffic volume demanded double in 2025. In JCAB, based on the fundamental perception that customer service benefit would come from the highest levels of safety, CARATS will help us be even more proactive about preventing accidents with advanced safety management to better predict risks and then identify and resolve hazards.

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U.S.-India Aviation Cooperation Program

Mission

The U.S-India Aviation Cooperation Program (ACP) was established in 2007 as a public-private partnership between the U.S. Federal Aviation Administration (FAA), the U.S. Trade and Development Agency (USTDA), other US Government agencies and U.S. Companies.

The ACP supports the growth of the Indian civil aerospace sector by working directly with the Government of India (GOI) to identify and execute projects that encourage collaborations between US and Indian stakeholders, in the area of aerospace technology and best practices.

Objectives

- Promote greater engagement between US and Indian Government agencies and industry to enhance civil aviation in India.
- Undertake projects that advance Cooperation in domains such as aviation safety, security, regulatory oversight and management.
- Provide training and technical assistance to accelerate excellence in aviation operations.
- Within India, increase awareness of, and facilitate access to, US expertise, technology and best practices to assist India's aviation growth.

Focus Areas

- Air traffic management modernization
- Airspace and airport capacity analysis, development, and planning
- Aviation support industry development
- Aviation human resources
- Aviation safety
- Aviation security

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2. Pearl Shop in Domestic Security Hold at LBS Airport, Varanasi
3. Branded Womens wear Shop in Domestic Security Hold at LBS Airport, Varanasi
4. Gift cum Handicraft Shop in Domestic Security Hold at LBS Airport, Varanasi
5. Books, Magazines & Newspaper Shop in Check-in-Area at LBS Airport, Varanasi
6. Manglam Tours and Travel at Bhojubeer, Varanasi
7. General Leather Shop in Cheek-in-Area at LBS Airport, Varanasi
8. Vaibhav Travel & Tours, Co-operative Building, Mint House, Varanasi
9. M.S. Travels, Co-operative Building, Mint House, Varanasi
10. Snacks Bar in Visitor's Concourse (Arrival Side) at LBS Airport, Varanasi
11. Refreshment Center in Car Parking Area at LBS Airport, Varanasi

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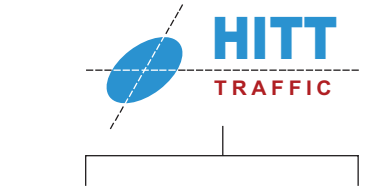

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