ADS-B-Out Applications: (This is a list of unique ADS-B applications identified by Fabrice Kunzi. It is not comprehensive or definitive.)

Application Name:	Concept/Description (MJ = Marisa Jenkins Thesis, RFG = Req. Focus Group):
ATC Surveillance in Non-Radar Airspace (ADS-B-NRA)	This application will provide ATC surveillance in non-radar areas such as below current radar coverage or offshore operations areas (e.g. Gulf of Mexico). Current Radar Procedures would be applied using ADS-B surveillance. Conceivably, new procedures could be created using surveillance information provided by the ADS-B message.
ADS-B Flight Following	Due to the higher coverage volume and the increased surveillance quality resulting from ADS-B surveillance, ATC will be able to better advise pilots of nearby traffic, minimum safe altitude warnings (MSAW), etc.
Non-Radar Increased IFR Airport Acceptance Rate	The availability of ADS-B surveillance where currently no Radar coverage exists allows the extension of ATC services to these airports. This removes the need for Procedural Separation increasing the throughput of aircraft.
Improved Search and Rescue	Flight Track data serves as an input to search and rescue operations. Having better accuracy of the last know position, a faster update rate as well as a bigger coverage area, ADS-B will enable more efficient and more accurate responses to emergency situations.
Center/Company/Online Flight Tracking	Current Flight Tracking is limited to areas with SSR coverage. ADS-B increases this coverage. This would, e. g., allow operators or companies to improve their fleet scheduling.
ATC Surveillance for En-Route Airspace (ADS-B-ACC)	ATC will use ADS-B surveillance information in the same manner as current dependent/cooperative surveillance system information is used, e.g., to assist aircraft with navigation, to separate aircraft, and to issue safety alerts and traffic advisories. The ADS-B surveillance information will be used to enhance the quality of existing radar-based surveillance information. Conceivably, a 3NM separation standard may be acceptable.
ATC Surveillance in Radar Airspace (ADS-B-RAD)	This is not an application in and of itself. Using existing Radar procedures, ATC operations overall may become more efficient as a result of increased surveillance quality and coverage. (ADS-B surveillance may reduce personal buffers of controllers, allow more accurate routing, etc. while still adhering to current procedures.)

ATC Surveillance in Terminal Areas (ADS-B-TMA)	Current Radar surveillance will be enhanced in Terminal Areas. An example would be airports with single radar coverage. ADS-B information could be used to enhance current ATC procedures or ATC automation systems such as tracking or minimum safe altitude warnings (MSAW).
Airport Surface Surveillance and Routing Service	ADS-B surveillance is provided to air traffic controllers to enhance situational awareness with respect to vehicles (not just aircraft) operating on the airport surface. ADS-B surveillance may also be provided to ground automation and decision support system to aid in the management of traffic flow on the airport surface. (MJ) This application may allow ASD-X like environments at non ASD-X airports. Conceivably, a pilot or ATC alerting function could be added to this application.
ATC Automation Integration/Automatic Flight Plan Canellation	Using information provided by the ADS-B message, some ATC functions could be automated. One such applications could be automatic flight plan opening or closing.
ADS-B Enhanced Parallel Approaches/ADS-B PRM	This application applies to two different environments. First, it would enhance parallel approaches at airports which use a precision runway monitoring radar (PRM). ADS-B may enhance surveillance quality. Second, ADS-B surveillance may allow airports without PRM to have a PRM like environment.
Emergency Locator Transmitter (ELT) Application	The ADS-B message has the capability to transmit a "Downed Aircraft" message. This could double as an ELT functionality.
Improved ATC Traffic Flow Management	The purpose of this application is to achieve an optimal spacing interval between successive arriving aircraft minimizing vectoring and multiple speed changes that can occur during a normal arrival sequence. The application is expected to be conducted in the en route and terminal environment, through a structured arrival route that connects to an approach procedure, and terminates at the final approach fix. In this application, ADS-B provides increased surveillance accuracy. ATC ground automation receives ADS-B position reports. Appropriate trajectory modeling algorithms develop a sequence for aircraft arriving at merge points. The sequence may be developed collaboratively with input from operators. Sector controllers implement the sequence. Multiple merge streams from multiple directions are supported. Decision support may be available to the controller in the form of suggested speed instructions. (MJ)
Enhanced Tower Situational Awareness in Reduced Visibility	Using ADS-B, a virtual image could be created to aid Situation Awareness for Controllers.

Radar Replacement	This is not an application. However, there is large benefit resulting from this from a financial standpoint. ADS-B antennas (GBT's) are an order of magnitude (or more) cheaper than Radars.
ADS-B Enabled Portable Devices for Airport or FBO Employees	Airline Employees (e.g. ramp operators) receive ADS-B reports from aircraft in their fleet and use the data to optimize allocation of ground infrastructure, such as gate space and support vehicles. (MJ)
Weather Reporting to Ground	If aircraft are equipped accordingly, weather specific information could be transmitted via the ADS-B message improving weather briefings to pilots on the ground and to enhance forecasting.

ADS-B-In Applications:

Flight Information Service - Broadcast (FIS-B)	Using and ADS-B datalink, NAS information such as NOTAM's, TFR's etc and weather information are linked directly to the cockpit and displayed on a CDTI. This results in Enhanced Weather Situational Awareness as well as Enhanced NAS Status Situational Awareness. Conceivably, this datalink could be used as a secondary means of communicating emergency information in case of VHF outage.
Traffic Information Service - Broadcast (TIS-B)	Like FIS-B, this is a data link application. Received traffic information can be displayed on the CDTI. Sources of this traffic information include ADS-B messages directly from other aircraft, ADS-R (Radar rebroadcast), etc.
ADS-B Traffic Situational Awareness on the Surface (ATSA-SURF)	Traffic operating on all parts of the airport surface is displayed on an airport map on the CDTI. This can include appropriately equipped ground service traffic, as well. Flight crews may use the information during any phase of ground operations (pushback, taxi, etc.) This may also aid in preventing unauthorized entering of the active runway. This application is likely coupled with a moving map depicting taxiways and runways. May also include a LAHSO ghosting capability.
Airborne Conflict Management	This application uses appropriate algorithms to detect potential threat aircraft. It may or may not provide traffic/resolution advisories. It is possible, however, that this application could serve as a TCAS-like capability to aircraft that do not have TCAS. Also, if the aircraft does have TCAS, it may operate in coordination with TCAS to reduce frequency congestion. This application may also be required as an enabler for other ADS-B applications that include operations within the TCAS envelope.

Approach Spacing for Instrument Approaches (ASIA)	The purpose of this application is to achieve an optimal spacing interval between successive arriving aircraft minimizing vectoring and multiple speed changes that can occur during a normal arrival sequence. The application is expected to be conducted in the non-radar en route and terminal environment, through a structured arrival route that connects to an approach procedure, and terminates at the final approach fix. In this application, a CDTI provides guidance for pilots to maintain a set space or distance interval from preceding aircraft. (MJ)
Enhanced VMC Operations	In this application, the CDTI is used to detect and track aircraft more effectively in VFR conditions. Flight crews will use additional information provided on the CDTI to augment VFR procedures. This, for example, enhances visual acquisition of other aircraft. For example: This application is an aid for the flight crews to perform successive visual approaches when they are responsible for maintaining visual separation from the aircraft they are following. The objectives are to perform successive visual approach procedures on a more regular basis to enhance the runway throughput, and to conduct safer operations especially in high-density areas. (Thales)
CDTI VFR-like Separation in All Weather Conditions (IMC and VMC)	Using the CDTI, flight crews can remain at a safe distance to surrounding aircraft. Visual contact is not required. This reduces controller workload. Also, this application may enable the continuation of a flight under VFR where currently IFR would be used. This results in reduced controller workload.
CDTI-Based Visual-Like Approaches in All Conditions	Allows for the continuation of visual operations in deteriorated weather conditions. Flight crews use a CDTI to follow a preceding aircraft maintaining a much more accurate distance, increasing runway throughput.
Call Sign Use	This is not an application in and of itself but it is an enabling component to many. Having a CDTI on the flight deck allows flight crews and controllers alike to refer to other traffic by their call sign. It is not yet clear if multiple parties using a call sign creates confusion. Procedures giving guidance to how one is to refer to a third party have yet to be created.
CDTI Continuous Descent Approach	Using the CDTI, flight crews can remain at a safe distance to surrounding aircraft. Visual contact is not required. This reduces controller workload.

Flow Corridors	Flow corridors consist of tubes or “bundles” of near-parallel trajectories in the same direction, which consequently achieve a very high traffic throughput, while allowing traffic to shift as necessary to enable more effective weather avoidance, reduce congestion, and meet special use airspace (SUA) requirements. The high traffic density achieved increases the airspace available to other traffic, and often eliminates the need for a Traffic Management Initiative (TMI); thus the flow corridor is implemented along the optimum routes and altitudes. Aircraft within the corridor are free to optimize their trajectory provided they maintain separation from other aircraft. (AIWP Description)
Enhancement to RNP Procedures	In conjunction with RNP, ADS-B surveillance may allow for even more efficient airspace use than by RNP alone. For example, parallel routes could be spaced more closely together beyond that which RNP navigation alone can provide. Aircraft are vectored by ATC onto parallel routes. ATC achieves an initial stagger between adjacent aircraft. The trailing aircraft follows ADS-B derived speed guidance to maintain the desired stagger value using a CDTI. The geometry of the stagger guarantees collision protection in the event of a blunder. Each route may require some limits on the performance of participating aircraft.
Final Approach and Runway Occupancy Awareness	Using a CDTI that shows the runway environment and other traffic, increase the flight crew's awareness of aircraft and surface vehicles that are on or near the runway surface or up to approximately 1000 feet above ground level (AGL) on final approach as well as during take off. This application may include alerting. (Definition from VOLPE Center) Some definitions include this functionality under the ATSA-SURF application.
ITP Climb and Descend	aircraft without the necessity of ATC providing procedural non-radar separation which currently can be up to 100 miles between aircraft (SBS CONOPS v3.0, 4.2.1.8). The procedure enables an aircraft that desires to change its flight level in oceanic airspace to a new flight level by climbing or descending in front of or behind another aircraft, or between two same-track, potentially blocking aircraft which are at an intervening flight level. This allows for climb or descent requests to be approved when conventional, procedural separation does not exist. Collision

ITP Crossing and Passing	ATC informs the flight crew of the flight identification of the traffic to cross or pass and issues instructions about the desired interval (expressed in terms of time or distance). Optionally, ATC may issue instructions detailing the manner in which the spacing shall be achieved. On-board equipment provides speed and, if needed, turn commands to achieve desired spacing. The flight crew implements speed commands via inputs to conventional autoflight controls. (MJ)
ITP Follow	ATC informs the flight crew of the flight identification of the traffic to follow (TTF) and issues instructions about the desired interval (expressed in terms of time or distance). Optionally, ATC may issue instructions detailing the manner in which the spacing shall be achieved (e.g. vectors). On-board equipment provides speed and, if needed, turn commands to achieve desired spacing at the merge point. The flight crew implements speed commands via inputs to conventional autoflight controls. A cockpit design that integrates ADS-B-based guidance with autoflight functions is also conceivable. Multiple merge streams are supported. (MJ)
ITP Merging and Spacing	A controller may desire an aircraft to fly a vector heading to increase spacing and proceed directly to a merge fix once appropriate on-board algorithms have determined that the desired interval will exist. The flight crew implements speed commands via inputs to conventional autoflight controls. (MJ)
Airline Based En-Route Sequencing and Spacing	This is the equivalent of ITP Merging and Spacing but instead of ATC providing the commands, the airline flight ops center does.
Non-Radar Airspace Delegated Separation	Flight crews use the CDTI to maintain a given separation from (another aircraft which was previously identified by ATC. This situation could arise at a non-towered airport with multiple IFR departures where ATC gives clearances for an aircraft to follow another into radar coverage.
Non-Radar Airspace Self-Separation	This application would be used in areas where there is no radar coverage nor does ATC provide Separation Services. Flight crews use their CDTI to remain clear of other aircraft until in entering into airspace where ATC services are provided.
Enhanced Parallel Approaches	In VMC as well as IMC, flight crews can use the CDTI to maintain a given separation from the lead aircraft. This reduces the workload on the controller. It also increases runway throughput since optimal spacing can be achieved due to better surveillance quality.

Radar Airspace Delegated Separation	Appropriately equipped aircraft enter designated airspace and assume responsibility for separation from ATC designated aircraft. Appropriate tools provide decision support in the form of viable alternatives to resolve detected conflicts. An ADS-B- based collision avoidance system may also be required.
Radar Airspace Self-Separation	Appropriately equipped aircraft enter designated airspace and assume responsibility for separation from all other aircraft operating in that airspace. Appropriate tools provide decision support in the form of viable alternatives to resolve detected conflicts. An ADS-B- based collision avoidance system may also be required. Separation Responsibility is transferred from ATC to the flight deck. (MJ)
Traffic Aware Strategic User Requests with Limited Delegation	In this application, a user enters a request for a specific operation. ATC approves the request designating the airspace in which the operation is to take place. This airspace may then be closed off or designated as restricted airspace to other aircraft. An example may be a helicopter providing an airlift to a specified location.
Wake Visualization and Avoidance	Using ADS-B message data as well as current weather information, the behavior of wakes may be visualized and displayed on the CDTI. Conceivably, this application may even provide guidance on how to avoid these wakes.
Obstacle Awareness Application	Under this application, ADS-B Transmitters could be installed on obstacles (such as towers or cranes) alerting pilots