Prepared remarks for Edward L. Bolton Jr., FAA Assistant Administrator for NextGen, to the 17th Commercial Space Transportation Conference, Feb. 5, 2014

(General Bolton began with an anecdote about his experience overseeing numerous space launches as a commander in the U.S. Air Force)

Now I'm working on the Next Generation Air Transportation System (NextGen). We're transforming our airspace to ensure we continue to have the safest, most efficient air transportation system for decades to come. At NextGen, we make it our business to prepare for the future, from research to implementation. Commercial space and NextGen definitely intersect.

My boss, Mike Whitaker, just described all the ways that the FAA is committed to supporting commercial space operations. I will focus on just one aspect of that work, and that's the challenge of space and air traffic integration.

It's a complex undertaking to clear our skies for a group of vehicles that have a much different operational profile than any we're used to. Space vehicles fly different trajectories. They aren't bound by a 60,000 foot ceiling, or the procedures that map our highways in the sky. They fly much higher and much faster than other aircraft.

Some of them aren't even ballistic from the ground. They piggy back on another vehicle and launch from the air.

While we can project where they're going, we can't accurately track launch and re-entry vehicles with existing tools. We can't see them on our radar scopes or traffic management displays. In some cases, we rely on the operator to provide their own telemetry to us. Sometimes that's

using a telephone. One operator gave us a secure web portal that could provide the continuous lat-longs of their space vehicle, but that's not as useful as having the information on our displays.

The other reality is the potential effect of a space vehicle incident on aircraft in flight. Our commitment to safety is to protect the commercial space vehicle, but it's also to protect every other aircraft from a potential debris field. In the event of a failure, we want everyone else well clear of falling debris.

So we preemptively block hundreds and hundreds of cubic miles of airspace. In some cases, oceanic flights have to be diverted inland. Even if this airspace is only "hot" for 30 minutes, rerouting traffic begins hours before.

With careful planning, we do that well when we only have a few launches a year. But we're expecting the demand to gradually increase, perhaps to several per day by 2025. And we have to come up with better tools than we use now in the planning phase. Right now, it's all manual and resource intensive. We use the telephone a lot. Our Command Center evaluates requests on a case-by-case basis. It can take weeks and months to plan one launch. These launches tend to get canceled or delayed, which can add to the difficulty. And the tools we use to communicate with stakeholders aren't ideal in these circumstances.

The FAA has licensed or permitted about 250 commercial launch and re-entry operations, including amateur rockets, since 1988. So we aren't completely new to this. But for the most part, space travel until now has been limited to federal ranges. Now we have space ports opening across the country, so this geographic diversity is a new challenge, and will drive our development of tools and capabilities.

We also don't have great tools to gauge the impact that these space launches are having on traditional air traffic. My concept analysis team did a detailed study of one launch, and I want to share the results with you. Keep in mind, this is just one launch, and therefore not a representative sample of how every launch impacts the efficiency of our airspace. We did the analysis to help us assess strategies used by air traffic controllers. We use the results to refine our models, and to accurately represent this impact in simulation activities.

We closely examined a launch from Cape Canaveral last year *[using a visualization tool and some internally developed programs that calculate distance.]*

We found significant impacts for flights in the Jacksonville and Miami areas during the launch, flying longer distances, taking more time and burning more fuel. *[Impacted flights had to fly between 25 and 84 nautical miles longer to avoid the restricted airspace. That meant they burned between 275 and 2,400 pounds more fuel. And they flew between 1 and 23 minutes longer as compared to similar days with no launch activity.]*

On re-entry to the waters of the West Coast, the analysis showed that flights traveling to or from Hawaii and Australia would be impacted by the re-entry operation, but domestic and other international flights would only be minimally impacted. *[Significantly impacted flights flew between 15 and 27 nautical miles more. They burned between 458 and 576 pounds more fuel. And they flew between 1.5 and 7 minutes longer to avoid the re-entry special activity airspace.]*

The impact of a launch on a "normal" air traffic day creates these kinds of delays, but a launch during heavier traffic periods, such as holiday or seasonal travel, presents an even larger challenge. It's a safety factor as

well if we're re-routing heavy volume traffic if other constraints are present like bad weather, because it challenges air traffic controllers in individual sectors.

What does all of that mean? We have work to do. We have to find a more efficient way of incorporating a growing demand for commercial space operations, and continuing to accommodate traditional users, without ever compromising safety.

Here's how we're helping.

The FAA plans to release a concept of operations later this year *[in August]* that will outline our objectives and our vision for how to accomplish those objectives. All corners of the FAA – NextGen, Commercial Space, Air Traffic – have been working on this ConOps collaboratively with NASA, DoD, airlines, space operators and space ports. Once we target our future state, we will begin the process of determining how to get to it in manageable, incremental steps.

The ConOps will cover pre-launch, launch, recovery and an impact assessment on safety and our airspace. It will give us a good foundation for what needed enhancements will be.

We want improvements in the planning phase and in real-time traffic management. And we want to build a dynamic response capability so that when a vehicle has cleared a portion of restricted airspace, controllers can begin using it as soon as practical. And in the event of a failure, we want to be able to respond quickly to ensure that aircraft are routed to avoid falling debris.

Here's how NextGen fits in. We're going to be able to leverage a lot of the lessons learned from our work on NextGen. We are already building a platform that can be more flexible to accept new procedures and

advanced technologies. We are working on better decision-support tools, improved communication and information sharing, and real-time aircraft tracking. We expect NextGen improvements in voice and data communications to integrate the operator into real-time surveillance, monitoring and decision making to better integrate air and space traffic management. NextGen is focused on improving efficiency in our airspace. All of these experiences will help us in our efforts to accommodate new entrants.

Access to space is becoming more affordable. That's driving new opportunities for everyone, including universities, nongovernmental entities and private sector spacefarers.

Commercial space is an exciting frontier. It's something we dreamed of as kids and now we get to play a part in making it accessible to more and more people. We are committed to doing that efficiently, and without compromising safety.