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Title: The Effect of Unmanned Aircraft Systems (UAS) on En Route Sector Congestion and Commercial Aviation Throughput under Different Future NextGen Architectures

Abstract: Although the Unmanned Aircraft Systems (UAS) flights that exist in today's national airspace system (NAS) are mainly in special use airspace, the civilian applications of UAS technology are numerous. Virtually any mission that is either routine or a pilot in danger could be satisfied through UAS flights. Accordingly, UAS flights are predicted to grow at fast pace within the military, civilian and commercial sectors after 2015. In this presentation, we assume their growth is based on manufacturers' ability to produce these vehicles. These UAS growth estimates indicate that there will be more UAS flights in 2040 than the combined commercial and general aviation (GA) flights that fly using instrument flight rules (IFR) in the NAS today.

Predictions for future commercial traffic, such as the Terminal Area Forecast (TAF), are based on economic drivers largely independent of the en route and terminal capacities necessary to support those operations. As such, without sufficient NAS capacity, the ability to accommodate that growth is limited. To create a constrained schedule, we "remove" flights from the unconstrained schedule until no more demand reduction is necessary. We employ an integer programming heuristic that tries to optimize the amount of overall projected throughput.

In this presentation, we use the LMINET model to estimate the projected throughput with 2025 and 2040 demand cases under different Next Generation Air Transportation System (NextGen) operations levels. The results indicate that the system performs reasonably well under advanced NextGen operational levels for the commercial and GA traffic. However, under the assumption of equivalent separation standards for UAS flights as those of commercial and GA IFR flights, the ability of the system to handle the additional UAS flights is dramatically worse. These results dictate the need for UAS concepts which allow large numbers of them to operate without air traffic controller separation assurance.