Recent developments in radio frequency identification (RFID) technology have enabled the aviation industry to benefit from its huge potential to solve issues related to baggage mishandling and to improve passenger journeys. The International Air Transport Association (IATA) estimates that more than $733 million savings by airlines alone can be realized through RFID adoption when fully implemented in the top 200 airports. Despite the obvious benefits of RFID technology in airport industry service applications, potential implementation obstacles and technical deployment challenges have to be overcome for effective, low cost and reliable passive RFID-based baggage handling and passenger asset monitoring systems. In the existing RFID system, where the RFID readers are usually placed on the conveyors, the reliable read range is often limited to a few meters. Location is then inferred from the last portal a tag is read at. In addition, the RFID tags reading accuracy varies from 97-99% in most implemented systems. This work aims at improving airport efficiency and security through real-time locating and tracking of both passengers and baggage within airport facilities. We propose to apply the concept of optical distributed antenna systems (DAS) to RFID, to develop an intelligent, adaptive, and self-organizing passive RFID real-time locating system (RTLS), suitable for deployment in airports. This system can provide reliable coverage over a wide area using only few RFID antennas. Our system will have the following characteristics and advantages. Firstly, the RFID DAS system will allow users to rapidly identify all tags and collect information with a reading tag accuracy of 100% compared to ~90-99% for the existing implemented RFID system. And thus, it can eliminate the error of manual operation. Secondly, the interrogation area or the reader coverage is greatly expanded up to 20 meters compared to 3 meters range of the existing system. Thirdly, in addition to baggage handling, the system can also track passengers and airport staff and devices. Finally, this system will provide a glimpse of the great potential returns that will support the smart airport vision.