

# M

## Munich Airport International

### Seek and ye shall find: Baggage handling solution at Munich Airport

*Suitcases are not allowed to travel unaccompanied, consequently they must be unloaded if the passenger does not show up. This costs time and money – now at Munich Airport IT is being enlisted to solve the problem, without however creating a security gap.*

*by Johann Götz, technical project leader of Flughafengesellschaft München (Munich airport operating company - FMG)*

Everyone is in a hurry on Monday. Early in the morning business people, travelers, and commuters gather to take LH 036, the 6:40 AM Lufthansa flight to Hamburg. Boarding starts punctually, the passengers routinely show their tickets to the stewardesses and by 6:30 AM the airplane is already full. Almost full. One passenger is missing. However his suitcase isn't – it is already in the belly of the aircraft. Previously this usually meant: The airplane will now have a late arrival in Hamburg.

According to Paragraph 20a of the German Civil Aviation Law this suitcase must be unloaded. This has not just been the case since September 11, 2001. Even before lawmakers were concerned that somebody would bring a bomb aboard an airplane and then prefer to stay on the ground. Thus unloading the suitcase is important for security reasons, but it takes a lot of time. The men on the apron must search for the abandoned suitcase in the belly of the aircraft based on its luggage tag, and that usually takes about thirty minutes. This is an irritation for the passengers and expensive for the airport, which then has to pay penalties due to suitcases left behind or deal with delays due to incorrect baggage handling.



The Munich Airport and Deutsche Lufthansa want to avoid these delays in the future by improving the places of loading for luggage. In its pilot phase, the "Electronic Automatic Baggage Loading Equipment" project (EAGLE) has already reduced response time to an unload requirement, and thanks to the documentation specifying the place of loading, it has also significantly reduced the unload time. The airport's baggage service organization and system developers set up the project. Service providers, Gcon from Ismaning, and security experts NCP engineering GmbH from Nürnberg were called in for targeted solutions.

The goal: Documentation for baggage checking, visualization of baggage checking status for the airline, and fast response time on the part of the airline if there is an unload requirement.

To shorten search times apron personnel must know where the desired suitcase is located. Previously for large aircraft this meant unloading the containers where baggage is stored (approximately 20 suitcases in each container) and searching one container after the other until the suitcase is found. Now since the

EAGLE project, personnel scan the barcodes that are already printed on the luggage tags before a suitcase is placed in its container. Rudolf Donig, EAGLE project leader, sees additional advantages in this regard: "Here it is now possible to differentiate between different luggage items as well. For example, containers can be "built" with prioritized baggage items. Thus it is also easier for subsequent airports to promptly bring transfer luggage to the connecting flight. "The scan data are sent to FMG's baggage management system via the WLAN at the airport. This system actively supplies the connected WLAN scanners with the data so that current data are present on the WLAN scanners. Thus it is possible for the user to query a given suitcase's place of loading at anytime. If a suitcase must be unloaded because its owner is not on board the aircraft, then this is displayed on the WLAN scanner. Although the luggage item still must be removed from the aircraft belly by hand, personnel are no longer compelled to unload all containers one after the other – since according to Murphy's Law the suitcase in question is guaranteed to be in the last container.



Scan, load, find – it sounds so simple but it imposes maximum requirements on both hardware and software. The WLAN-capable hand scanners are exposed to wind and weather, as they are used on the apron daily and must withstand temperatures ranging from plus 30 to minus 20 degrees. The FMG decided on the company Symbol that specializes in robust scanners for extreme situations.

## High IT security requirements

In addition to robustness, there are also high security requirements for connection setup and connection disconnect, as well as data transmission. The client software must function in such a manner that the user cannot intervene while the software starts and authenticates itself in the virtual private network (VPN). This is designed to prevent the scanners from being manipulated - or simply used incorrectly. In addition the scanner software must also be designed in a manner that guarantees that only this application can run, likewise for security reasons.

As soon as the device starts, the scanner loads the application and logs onto the airport's WLAN. This network is not visible to passengers because its "SSID" is switched off, i.e. the SSID is not freely transmitted. Only devices that know the name of the network can see it and logon to it. The central server also verifies whether the scanner really belongs to the airport, based on the device-specific ID. If the ID is correct, then the VPN Client from NCP sets up an encrypted connection to the VPN gateway, the scanner is permitted to authenticate itself, and thus it is in the network.

## Jumbo jets interrupt WLAN connection

Up to this point the functions cited have been standard functions of WLAN clients but on an airport apron the situation is more complicated. A jumbo jet is taxiing down the runway nearby, and suddenly breaks off the connection between scanner and access point. Thus the software must reconnect automatically, as soon as it gets a signal after an interruption, without the user having to wait or intervene. In addition, apron personnel must be able to move about on the apron, the client must support interruption-free roaming in WLAN networks – similar to a mobile phone that takes the connection along with it from one wireless cell to the next and the person on the phone doesn't notice a thing. In the tests we identified compatibility problems that needed solutions.

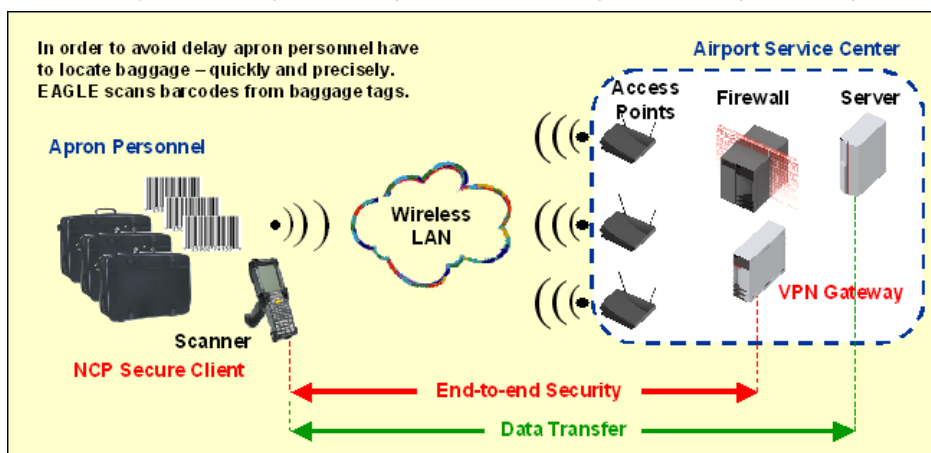
## A search for the right client

The security infrastructure, i.e. firewall and VPN gateway to which the clients must logon, consists of products from two major manufacturers. However when roaming, their own clients were not 100% compatible with the scanner's operating system, Windows Mobile 2003 CE. Neither were the third-party products recommended by the manufacturers able to perform the roaming and reconnect as seamlessly as required. The client from the scanner manufacturer, Symbol could not be used because it only works with its own VPN gateway. Thus FMG had to look for a different product.

After the unsuccessful tests we responded to a recommendation and made enquiries at the Nürnberg security firm NCP – they were successful. The NCP Client could be adapted to the Symbol software Companion and shadowing and reconnect could also be setup. This was quite a challenge because the VPN gateway itself was not from NCP. Since the NCP software is based exclusively on standards, integration in the existing IT landscape was no problem. To satisfy the full scope of complex function requirements the software

was modified slightly to connect with the gateway and re-logon automatically. Also roaming was seamlessly successful – thus NCP was superior to the competition.

But there was still another hurdle that the software had to overcome: If the scanners go too long without battery power then they revert to their "original status", the client software with all the required configurations can no longer be used. In practice this can easily occur



on the apron. If a battery is empty it can be a few hours until the device is returned to a power source, but after 10 minutes the configuration has been forgotten. NCP had to adapt the software especially for these "cold starts", as they are referred to in airport jargon. There were several ways to solve the problem. The solution we chose was to completely reinstall the software after a cold start. Thus the software and the configuration files are permanently stored on the device, for this purpose.

## Pioneer work in 6 months

Since this project was the first of its kind, preparation and tests extended over a period of nearly 6 months. The cold start function in particular demanded quite a lot from all participants. Every configuration file from NCP had to be precisely examined to achieve the desired result. Now that this fundamental work has been accomplished each similar project goes significantly faster. We were able to implement this project in four weeks. Now a pilot project is underway with 28 (soon to be 141) scanners on the apron, unload times have been significantly reduced and other airlines are also showing interest in the solution.

### The project in short:

**Client:** Lufthansa AG

**Participating service providers:**  
Flughafen München GmbH, Gcon IT Consulting, NCP engineering GmbH

**Project time:**  
approximately 6 months

**Goal:**  
Reconciliation of baggage, costs and time reduction in baggage handling