

# Automatic Access Control System Tokens and Readers

## A Procurement Guide

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## About this document

This document has been produced by CPNI to give guidance suggesting a list of key security principles to be considered when procuring Radio-Frequency Identification (RFID) smartcards and readers for Automatic Access Control Systems (AACS). It is written as advice for areas of HMG, the Critical National Infrastructure (CNI), their agencies and suppliers.

## About AACS

An Automatic Access Control System is an electronic system controlling entry into and/or exit from a specified area.

Smartcards securely store a secret unique user ID which is transferred to a reader over a secured RFID communications link. The reader then delivers the user ID which when combined with a separate typed-in user PIN provides authentication to the AACS combiner.

## Key security principles

The following security principles should be considered when procuring AACS comprising of smartcards, or tokens, and readers.

Principle 1	Protect user ID in transit
<b>Why this matters</b>	Interception of sensitive data in transit could allow unauthorised site access.
<b>Recommendations</b>	<ul style="list-style-type: none"> <li>• Transfer of the user ID from the smartcard to the reader should be protected using encryption.</li> <li>• The above authentication and encryption should be based on known good cryptographic standards (see NIST SP 800-57 part 1 and NIST SP 800-131A, available at <a href="http://csrc.nist.gov">csrc.nist.gov</a>).</li> <li>• Where such standards are not used, the supplier should provide evidence to show that the cryptographic mechanisms and algorithms used are suitable. Note: This task is likely to be non-trivial.</li> <li>• Note: Communications between the reader and the AACS controller should be protected in line with general CPNI AACS system guidance.</li> </ul>

<b>Principle 2</b>	<b>Protect sensitive data at rest</b>
<b>Why this matters</b>	Unauthorised access to sensitive data on a compromised device could allow unauthorised site access.
<b>Recommendations</b>	<ul style="list-style-type: none"> <li>• The smartcard should only transmit its user ID (via an encrypted link) after the reader has been successfully authenticated by the smartcard.</li> <li>• The smartcard should otherwise generally prevent sensitive data being trivially accessed. (Note: external certification, such as Common Criteria, can help to provide evidence of such protection.)</li> <li>• The reader should not retain any sensitive data (user credentials or cryptographic material), other than a reader key if required (stored in a part of the reader, located inside the site perimeter).</li> <li>• The user PIN should not be stored on the smartcard – to protect against loss of smartcard compromising both user ID and PIN.</li> </ul>

<b>Principle 3</b>	<b>Secure externally-accessible reader hardware</b>
<b>Why this matters</b>	Undetected reader tampering could allow authorised access to user IDs and PINs. Unsecured reader interfaces/ports could allow unauthorised access to sensitive data.
<b>Recommendations</b>	<ul style="list-style-type: none"> <li>• The externally-accessible part of the reader should be manufactured so that any unauthorised tampering is evident during a security audit.</li> <li>• The externally-accessible part of the reader should not expose any interface ports that could allow unauthorised access to (or modification of) sensitive data, either within the device or wider site systems.</li> <li>• Note: Sensitive data here also includes reader firmware.</li> </ul>

<b>Principle 4</b>	<b>Minimise impact of compromise</b>
<b>Why this matters</b>	Compromise of a smartcard holding cryptographic material shared with other devices could result in wider AACS compromise.
<b>Recommendations</b>	<ul style="list-style-type: none"> <li>• The sharing of sensitive key material (e.g. private keys, symmetric keys, etc.) between multiple smartcards should be avoided.</li> <li>• Similarly, a smartcard should not store sensitive reader key material.</li> <li>• As stated elsewhere, a reader should not retain any cryptographic material other than its own key.</li> </ul>

<b>Principle 5</b>	<b>Use trusted smartcard provisioning and support</b>
<b>Why this matters</b>	Lack of trusted smartcard/PIN management (provisioning, revocation, re-issuing, etc) risks unauthorised persons gaining access to sensitive user access control details.
<b>Recommendations</b>	<ul style="list-style-type: none"> <li>• If sensitive smartcard data (key material and User Identifiers) and user PINs are not generated and managed locally, a trusted source should be used to do this.</li> <li>• Similarly, a trusted source should also be used to manage any external escrow arrangements.</li> <li>• If smartcard provisioning is being undertaken by a third party, consider service level agreements and emergency provisioning plans for use in business continuity emergencies.</li> <li>• Note: Careful consideration should also be given to the general acquisition of readers and smartcards through a trusted supply chain.</li> </ul>