

# Chinese ID cards

## Security features and issuing logistics

by **Jiangheng Lin**

The ID card system used in the People's Republic of China was first introduced in the early 1980s with the establishment of a dynamic administrative mode capable of supporting a modern population (economically as well as socially). The first ID card was issued on 1 October 1984, since when over 2 billion ID cards have been issued to Chinese citizens. Over the years, the security of these documents has improved steadily (the transparent hologram, for example, was introduced in 1996). A brief introduction.

Responsibility for the issuance and administration of ID cards resides with the Ministry of Public Security (in accordance with Chinese law). The sources of raw materials, the manufacturing facilities and the distribution process are controlled centrally. The actual ID cards are issued from centers and stations all over the country, which also record the holders' personal data. Some 130 production centers or stations employing 4,000 staff were established to distribute the early ID card, which was not as technologically advanced as later models.

To improve the administration and identification of its citizens, the Chinese Government initiated the development of next-generation ID cards in 1996. The project took eight years to complete, and a revised version of the ID card (hereinafter referred to as second generation ID card) was issued on 1 January 2004. At that stage, China not only operated the largest electronic ID card system in the world, it also pioneered the use of RFID ID cards. Although the manufacturing and issuance processes for the second generation ID card are largely unchanged, the number of issuing centers and employees involved in these processes has fallen sharply on account of technical improvements and higher productivity. At present, there are only 39 production centers employing less than 1,000 staff. Despite the significant rise in the number of documents issued, this head count is expected to fall

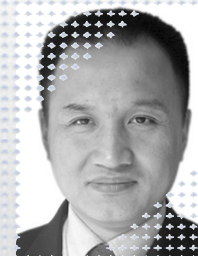
by about 400. At the same time, waiting times have been reduced from 3 months to 1 month (and in some instances a mere 2 weeks). The Chinese government has issued more than 800 million second generation ID cards over a period of four years - in many ways a remarkable achievement.

### The technical details of the first generation ID card

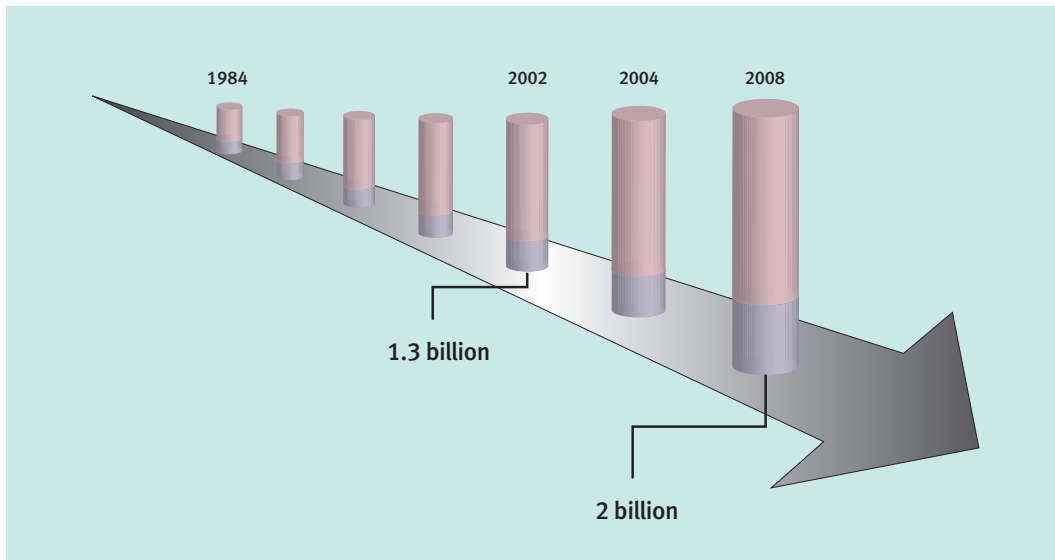
The first generation of Chinese ID cards (see figure 2) was based on portrait-data and an all-in-one photo ID system that was developed in 1958, and widely used in developing countries to issue driving licences during the 1960s and 70s. Some of the security features included on first generation cards were derived from banknotes and the card featured a rope design, a cluster of flowers, special intermittent dots and a micro taggant. The first generation card has included a transparent hologram and UV ink since 1996.

The key security features of the first generation card were:

- The network design (reticulate pattern) for the portrait-data side of the first generation card was CAD generated in China. In order to accommodate the network design (reticulate pattern), the authorities made several changes to the software, thus creating latent features for visual inspection.
- The Chinese characters recorded on the ID card use several font styles, including song, song imitation, bold, kai or li, etc. The Public Security Bureau, which issues the ID card, is printed using three Chinese characters. The upper right part of the Chinese character is slightly raised in song, song imitation, bold, kai or li styles. The issuing authorities have also developed a special font to create bespoke Chinese characters, which are used as a visual inspection feature. The font used is unique to the Chinese ID card and cannot be found anywhere else.
- The stamp affixed to the card displays an orange-red UV response when exposed to ultraviolet light. The inclusion of a UV feature is fairly unique given that UV powder was a pretty rare commodity in China at the time!
- Metallic ink was used to print the national emblem (red) and characters (black). The ink is easily detected and may be subjected to a quantitative analysis.
- Although the ID card's security features were initially covered by a laser holographic laminate, this was



**Jiangheng Lin** started his career at the First Research Institute of the Ministry of Public Security. He initially focused on the research and development of technologies - including security features - for the first generation Chinese Citizens' Identity Card. In 2000, he led a research team dedicated to the second generation of Chinese Citizens' Identity Card. The project, which affected 1.3 billion Chinese nationals, was successfully launched in 2004. Jiangheng has played a leading role in various important national projects, including the Chinese Citizens' Passport and the Foreigners' Permanent Residence Permit Card.



**Figure 1**  
Increase of Chinese  
passports issued  
between 1984 and 2008.

replaced in favour of an embossed laser hologram. Inefficiencies in the manufacturing process were addressed in the early 1990s while the development of 926 ID paper coincided with the introduction of a new security feature.

The legacy security features proved effective and were used to protect 1.3 billion ID cards.

### Second generation card - technical details

The second generation ID card (see figure 3) was developed in response to China's shift towards an information society. The authorities specified two key requirements, namely machine readability (21st century ID cards must have a computer interface) and the ability to store a biometric (in the form of a fingerprint). The need for enhanced security was met locally, courtesy of China's rapidly expanding security industry. Although the techniques included on the first generation card

could still be used, the inclusion of optically variable security laminates proved a leap forward.

As the second-generation card is machine-readable, it is able to communicate with external devices. This being the case, the security emphasis has shifted from physical to digital protection. This not only prevents unauthorized access, alteration or deletion, it also facilitates fast, automated identification.

The physical security features, on the other hand, are similar to those used by other issuing authorities. The card is protected by special materials, bespoke processes, a distinct background design, special inks, and DOVID as well as OMID features.

The key security features found on the second generation card are:



**Figure 2**  
Three examples of  
China's first generation  
ID card.

**Figure 3**  
Three examples of China's second generation ID card.



**Traditional security features**

- A background design created using Barco Software (a pattern of continuous and discontinuous lines);
- A bespoke font comprising Chinese characters (inherited from the first generation card);
- Rainbow printing and microprint;
- DOVID;
- The latent image is invisible when viewed vertically under normal light conditions. However, when viewed at an angle, an orange image can be seen. If the document is subsequently rotated by between 30 to 50 degrees, a green image becomes visible. If the angle of rotation is increased to 70 to 90 degrees, a purple image can be discerned (see figure 4).
- OMID;
- CHINA in Chinese and English (a gradual pattern within an oval shape). A positive or negative image is shown, depending on the angle of view (see figure 5).

**Digital security features**

The data on the card is encrypted using autonomous encryption technology (this has been applied to over a billion ID cards).

**Chips**

The Chinese authorities have used locally sourced chips offering modern RF interface modules, the latest security control functions, low power consumption, high reliability and secure code algorithm. Existing standards governing the chip's temperature and static resistance have also been tightened.

Table 1 shows how China's ID card compares to those issued by other countries.

The production of China's second generation ID cards relies heavily on automated processes. In addition to

**Figure 4**  
Latent image in China's second generation ID card.





**Figure 4**  
'China' written in English and Chinese. Traditional security feature in China's second generation ID card.

digital identification, IT solutions are used to number the ID card, to record personal data, to obtain the photo, to manufacturing the card, and to issue the card to the user (including user registration). Personal data are stored and managed in huge databases, optimising efficiency, safety and stability during and after the application process. The use of databases also allows data to be managed more efficiently.

- It relies on a secure public computer network for the collection and transmission of data;
- All machine readable data is stored on a contactless RFID chip;
- Extensive use has been made of encryption technology.

Due to a lack of legislation, biometric identification has not been incorporated in the second generation card. That said, the chip is 'biometrics-ready'.

**Table 1 - China's ID card compared to other countries**

Items	Applications abroad	Applications domestic	Generation 2 ID cards
Contactless IC technology	transport and access	transport and access	first in the world
Industrial scale	rather small	> tens of million	> hundreds of million
Types of templates	single	single	multiple: 10
Languages	1-2	monolingual	multilingual
Data exchange	monolingual	monolingual	bilingual
Card substrates	PVC, PC, ABS	PVC	PETG
Life span	< 3 years	< 3 years	> 10 years

### Information processing - features

A comprehensive ID information system has been established for the collection, transmission and processing of personal data. The total amount of data stored on all second generation ID cards issued to date amounts to 21 TB! This information includes a single colour photograph (size:1KB), common Chinese characters, rare Chinese characters, and several minority languages such as Zhuang, Mongolian, Tibetan, Ugar, Korean and Manchurian. The ability to verify the serial numbers has also been included.

The ID information software has been translated to each of the above languages (alongside a bilingual protocol for data communication).

To sum up, China's second generation ID cards offers the following features and functionality.

- It is based on a residence registration system;
- It is supported by a population administration system;

The development and implementation of new ID cards has caused the Chinese government to expedite the development of a new ordinary passport. The document, which will comply with ICAO's electronic standards, is due to be released in 2010.

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