

# Smart banknotes challenge

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Transactions have become a smart process. Within the current wave of technological developments; the inscription and identification of banknotes is a potential leap in efforts to create sophisticated anti-fraud devices. These new developments integrate the newest state-of-the-art transponder technology and allow instant verification of authenticity. Up until today the minimal dimensions reached by RFID chips were of down to about 1mm<sup>2</sup>, with a thickness of about 0.3mm. These dimensions made them unsuitable to be embedded in thin supports like material used to fabricate banknotes or common paper documents. Leading edge RFID technology has recently broken through the 0.4 mm barrier offering new miniaturised chips that pave the way for the development of a number of new applications.

Hitachi has developed its smallest RFID integrated circuit called the "Mu-chip", which is thin enough to be embedded in paper. An in-house venture company, "Mu-Solutions" was formed on July 1 as a catalyst to form value chains around this emerging technology. It will collaborate with both in-house business groups and external companies to help

hasten the proliferation of the Mu-chip. By integrating components, systems, solutions and company expertise, both internally and externally, Hitachi hopes to create a market for this emerging technology and expand business opportunities. Another way of looking at the venture is that it is an attempt to extract value from an intangible asset (IP) developed by research laboratories with a minimised time-to-market allowance. Hitachi America, Ltd., headquarters in Brisbane, California and a Hitachi, Ltd. subsidiary, will collaborate with its parent company on activity in North America.

## Characteristics of the invisible chip

The Mu-chip operates at a frequency of 2.45GHz, is 0.4mm square and thin enough to be embedded in paper. With the ID information being stored in the ROM (Read-Only-Memory) during the manufacturing process, it is highly tamper-proof. Its features in size, security and accessibility will find useful applications in document management where a high level of security is needed and distribution management where efficiency is a

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# counterfeiting

must. The Mu-chip will open up a new arena in electronic commerce in the era of global broadband communications. Increased dispersal is likely throughout a wide range of industry including finance, distribution, manufacturing, sports and entertainment. The Mu-chip is a new addition to Hitachi's product line, catering for the need of its existing customer-base that includes the worldwide smart-card industry.

Hitachi Ltd., headquartered in Tokyo, Japan, is one of the world's leading global electronics companies, with

consolidated fiscal sales of 8,417 billion yen (\$67.9 billion at an exchange rate of 124 yen to the dollar) in 2000 (ended March 31, 2001). The company manufactures and markets a wide range of products, including computers, semiconductors, consumer products, power and industrial equipment.

Hitachi America, Ltd. markets and manufactures a broad range of electronics, computer systems and computer products, consumer electronics and semiconductors, and provides industrial equipment and services throughout North America.

**The Mu-chip operates at a frequency of 2.45GHz. Its features in size (0.4 mm<sup>2</sup>), security and accessibility are ideal for applications in document management, where a high level of security is needed and distribution efficiency is a must**

Features of the "Mu-chip" include:

- the integration of a 2.45GHz high frequency analogue circuit and a 128-bit ROM with dimensions of 0.4mm square in silicon, to form the world's smallest RFID component;
- a reliable guarantee of authenticity by applying encryption technology to the 128 bit identification information;
- electronic information on networks and information on paper can be linked anywhere and anytime with assurance, thus making new services possible.

