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Information Distribution Platform for Multi-application IC Cards

In the past it was required to have a separate IC card for each purpose, but Masayuki Hatanaka, et al. at NTT developed an IC card which could be used for many applications. The technologies for realization of such a card were as follows: 1) technology to enable higher capacity/lower power consumption of IC card memory itself and cryptographic processing for multiple codes, 2) technology to enable safe/fast downloading and authentication between the application server and the IC card and from one server to another. They also proposed an IC card operation business model making it possible to separate service providers from card providers.

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Shinkansen Information Distribution System

Hiroshi Yoshimura, Toshiyuki Nakamura, and Yoshio Ishihara carried out the development of an information distribution system for the Tokaido Shinkansen, making considerable contributions to its operation. The Shinkansen communication system was based on a 400MHz mobile multiple radio communication system and a 1.2/5.6mm thin core complex coaxial cable communication system. In particular, employing an 8-line multisystem for the train radio and taking measures for weak electric fields against about 60km in total, selective individual calling and automatic call tracking was possible all the way along the line, and they eventually constructed a stable communication line. This achievement was unequaled anywhere in the world. In order to reduce inductive interference due to train operation by high-power alternating current, they adopted an aluminum sheath communication cable and the establishment of this technology was also noteworthy.

Kyouji Tsubouchi, Masakata Sawada, and Katsumi Fujiki developed the Computer-aided Traffic Control (COMTRAC) which enabled rapid response to fluctuations in transit demand and right time/way response to the disruption of traffic schedules and the Shinkansen Management Information System (SMIS) which provided information at the right time to improve the efficiency of maintenance management of train cars, tracks and electricity, and then put this into practical use. Regarding COMTRAC, this consisted of the control system for automating route setting at each station and the information processing system to perform transit planning and schedule control in the case of disruptions to train schedules. The former employed an always-on double-system synchronized operation system with three computers for control, the latter employed as a stand-by backup system, establishing a

highly reliable man-machine system. Regarding SMIS, facility inspection data and electricity/track measurement data from inspection cars from the car base and maintenance base were input to the host computers at the control center, and then in order to transmit the maintenance and repair plans to each location, an intelligent database terminal was used, thus realizing an efficient system.

Masao Yagi, Hajime Akagawa, and Toshihiko Kishimoto provided a high-dependable/high-quality Shinkansen train radio line. In order to perform communication, they also developed a new Shinkansen train radio system (LCX system) where a Leaky Coaxial cable (LCX) was set along the whole Shinkansen railway line and upline and downline LCXs were mutually backed up. This LCX system was put into practical use for the Tohoku/Jyoetsu Shinkansen starting in 1983. As a result, immediate calls by public phone on the train were realized. The operational performance of data communication on a running train with a high-speed of 210km/h was as follows: bit error rate at FSK of 1,200bit/s with a transmission speed of $1x10^{-5} \sim 10^{-6}$ compared to the set value $1x10^{-4}$ or less.

LCX: Leaky Coaxial cable