telecommunications. Annual sales of C-DOT equipment are said now to amount to R7 billion a year, on which the company earns royalty income of Rs200 million.

Again, the organization seems to have begun with a licensing deal with Siemens on software for digital switching gear, but it now reckons to be technically independent (thanks to several hundred software engineers at its New Delhi office). The chief user of its products is the Indian telecommunications system, which now has 7 million subscriber lines installed but which is growing at a remarkable 25 per cent a year.

C-DOT's products inevitably reflect the diversity of India's telecommunications needs. The larger switches are meant to handle 10,000 lines or more, but the company also worries about the villages, with the result that some switches are meant to distribute digital signals to single village telephones by means of high-frequency radio carriers. It is striking that the switches, whether small or large, use similar design tricks to provide redundancy, for example.

Technical skill abounds at the Bangalore development shop. The line managers are confident and as bright as paint. And, being a nationalized company, its directors say they are not dismayed at losing a substantial number of their engineers every year. Is that not part of the process of deepening India's technological base?

So has the past decade's investment been worthwhile? C-DOT has no doubt that, without an indigenous capacity to manufacture digital switches, India would be held to ransom by overseas manufacturers. But it is confident enough of its own products to look forward to buoyant export sales: now we're competitive, especially on price. So C-DOT is talking to the telecommunications authorities in other developing countries, hoping for great things in countries such as Indonesia and others in Africa, which have similar needs to those of India.

How good is that calculation? Whatever India's distrust of the market, the market will be the final arbiter of success. On the face of things, C-DOT has a technology that others will find attractive. It has not yet come up against the questions India habitually asks of manufacturers in the West, that of whether they will license local manufacture of equipment. It will be interesting to see whether India, with its long-term worry about the need of jobs at home, will be as compliant on this point as it expects others to be.

But is there not always the domestic market? That is where even the first stages of economic reform may hurt, for they allow overseas manufacturers to manufacture their wares in India. But

local people are convinced that overseas companies will not be able to hire Indian engineers for salaries as low as the Indian companies offer.

But even that supposes that the technology of telecommnications will remain what it now is. At the beginning of December, a delegation from Motorola was due in India to seek membership in a satellite-based global cellular telephony system. Given the comparatively low penetration of telephones in India and the problem of the villages, might it not be simpler to start all over again with a cellular system. The offer will probably be turned down on this occasion (they only want our money). But it will not be the last opportunity of its kind. □

Data delivery to the people

How many hand pumps are in working condition in Kuppam village in Tamilandu state? How many infants died of cholera in Kavaratti (an Indian island in the Arabian Sea) in May 1993? Five years ago, central government officials in New Delhi would not have dared to ask these questions. The information either did not exist, or it travelled too slowly to be of any use.

Not any more. The task of governing a country as large as India has become easier thanks to the satellite-based computercommunication network being operated by the National Informatics Centre (NIC) in New Delhi. Now, officials can key in their queries on NIC terminals on their desks. NICNET, as the network is called, brings to their screens answers to such questions as the number of cows in a particular village or the length of roads in need of paving.

Information on vital sectors of the economy such as health, agriculture and water are now stored inside NICNET's super- and super-minicomputers distributed across India. The database is constantly updated. Planners and decision makers in state capitals and central government can access these databases using home-made antennas looking at India's INSAT-ID satellite.

According to N. Seshagiri, director-general of NIC and architect of the concept, "NICNET is the largest data network of its kind used for government administration". It now links central government ministries in New Delhi with 32 state capitals, and the state governments with all the 500-odd districts — the basic administrative units of the country.

In the next phase, the network will be expanded to the block level. India is divided into about 6,000 blocks each consisting of 115 villages in a 12-km radius. In 1996, NICNET will have in its computers basic data pertaining to each of its 600,000 or so villages.

Seshagiri says that NICNET, which provides electronic mail, file transfer and bulletin board services, has helped to bridge the communication gap between centre and state governments, and between district administration and the state capital. "Every day 240,000 transactions take place", he says. From February 1994, officials will be able to hold video confe-

rences, a saving on travel expenses.

The government has invested about £50 million in NICNET, but the unquantifiable returns are proving much greater. For example, officials in Delhi are using the network to monitor the progress of centrally funded development projects worth £30,000 million. State governments are also finding NICNET extremely useful. For instance, a Karnataka agricultural bank recently discovered that by using NICNET it could process the monthly statement from all its 177 branches in the state in one hour on the first day of the month. Previously, the task had taken 20 days for 12 people working 12 hours a day.

NICNET came in handy in 1992 for reporting results of the general elections and during the 1991 census. For the first time, the census data pertaining to 850 million people were processed and brought out in report form in less than a year. And after this year's devastating earthquake in Maharashtra, NIC's mobile Earth station established 24-hour link between rescue teams and the state capital.

Although only government departments can now use NICNET, Seshagiri is soon hoping to get approval for opening it to nongovernmental agencies and foreigners. Though its services to the ministry are free, NIC earns £2 million annually from public sector companies and is hoping to earn more by selling specialized databases.

As things are, the general public can use NICNET's special terminals, installed in several cities, to obtain such information as hotel and medical facilities or railway timetables. Another database accessible to the public is about proceedings in the supreme court and high courts. By paying £1, a litigant can use an NICNET terminal anywhere in India to know about the status of his case and when it is posted for hearing.

According to Seshagiri, with the evolution of NICNET, much of the information previously accessible only to a few government servants has come into the open. This is a good thing he says "because transparency of information will lead to a situation where officials cannot afford to be corrupt".

K. S. J.