EIGHTEENTH REPORT

STANDING COMMITTEE ON INFORMATION TECHNOLOGY (2001)

(THIRTEENTH LOK SABHA)

MINISTRY OF COMMUNICATIONS (DEPARTMENT OF TELECOMMUNICATIONS)

WORKING OF CENTRE FOR DEVELOPMENT OF TELEMATICS (C-DOT)

Presented to Lok Sabha on 21.3.2001

Laid in Rajya Sabha on .....

LOK SABHA SECRETARIAT
NEW DELHI

March, 2001/*Phalguna,* 1922 *(Saka)*

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COMPOSITION OF THE STANDING COMMITTEE ON INFORMATION TECHNOLOGY (2001)

Shri Somnath Chatterjee — *Chairman*

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1. Shri P. D. T. Achary — *Joint Secretary*
2. Shri S. K. Sharma — *Deputy Secretary*
3. Shri A. S. Chera — *Under Secretary*

INTRODUCTION

I, the Chairman, Standing Committee on Information Technology (2001) having been authorized by the Committee to submit the Report on its behalf, present this Eighteenth Report (Thirteenth Lok Sabha) on "Working of Centre for Development of Telematics (C-DOT)" relating to the Ministry of Communications (Department of Telecommunications).

2. The Committee took oral evidence of the representatives of the Department of Telecommunications and Centre for Development of Telematics (C-DOT) at their sittings held on 1.8.2000 and 31.10.2000.

3. The Committee wishes to express its thanks to the representatives of the Department of Telecommunications and C-DOT for appearing and placing before it the detailed written notes on the subject and for furnishing the information, that the Committee desired in connection with the examination of the subject.

4. The Committee expresses its thanks to C-DOT Manufacturers' Association also for placing before the Committee detailed information on the subject.

5. This Report was considered and adopted by the Committee at its sitting held on March 13, 2001.

6. For facility of reference and convenience, the observations and recommendations of the Committee have been printed in bold letters in the body of the Report.

NEW DELHI;
16 *March*, 2001
25 *Phalguna*, 1922 *(Saka)*

SOMNATH CHATTERJEE,
Chairman,
Standing Committee on
Information Technology.

REPORT

WORKING OF CENTRE FOR DEVELOPMENT OF TELEMATICS (C-DOT)

Introductory

Centre for Development of Telematics (C-DOT) is a premier telecom technology development centre of India. C-DOT has developed a wide range of highly cost effective Digital Switching Systems for rural and urban applications. The range extends from a 200 lines Rural Automatic Exchange (RAX) which is capable of operating in non-airconditioned and harsh environment and does not require any air conditioning. For urban applications C-DOT has 40,000 lines switching systems, complete with Common Channel Signalling No. 7 (CCS7), Intelligent Network Services, Integrated Services Digital Network (ISDN), Network Synchronisation and V5.X Capabilities. The switching systems based on C-DOT Technology have a large presence in the Country's Telecom Network. They account for over 40% of the total lines of the network. In terms of exchanges, the share is above 90% as C-DOT technology enjoys a leadership position in the rural network comprising small exchanges.

2. C-DOT is a multi-dimensional organisation with many other technologies in radio, opto-electronics, satellite and network management fields. Work is in progress in many leading edge technologies like Synchronous Digital Hierarchy (SDH), Asynchronous Transfer Mode (ATM), Fibre Access Systems etc. ATM Switches have been installed in 5 places *viz.* Delhi, Mumbai, Chennai, Calcutta and Bangalore. It has been further stated that C-DOT technology, being of indigenous origin can easily be modified and updated in response to the changing environment. The Member (Production), Telecom Commission and the Secretary, Department of Telecom Operations while deposing before the Committee stated that C-DOT has rendered a very appreciable service in the telecom arena of our country. Out of 3.3 crore direct lines installed in the country, 1.4 crore lines and 35,000 Exchanges units are based on C-DOT technology. It has developed Time Division Multiple Access-Point-to-Multi-Point (TDMA-PMP) system for rural communications and is working on a new generation of mobile system which would be installed in 27 cities.

3. Objectives of C-DOT are achieving self-reliance in Telecom Technology; building an Organisation of Excellence to meet current and future needs; building human resources in a key sector; laying special emphasis on rural communications; helping build an industrial infrastructure for Telematics and to provide proactive customer support to assist in operation and maintenance.

Development of Products/Technologies

4 The Committee desired to know about the products/technologies of C-DOT. In reply the Executive Director, C-DOT submitted that C-DOT is basically an R&D Unit. It develops technologies and then makes prototypes. After getting technology approval from Telecom Engineering Centre (TEC) it transfers technology to more than 50 manufacturers which are in public as well as private sector. Manufacturers produce equipment as per design supplied to them and pay royalty to C-DOT. So far, about 15 products are stated to have gone into the Indian network. According to the Executive Director, C-DOT, the value on entire products which have gone in to the DoT network comes to Rs. 4745 crore.

5. The witness further stated that C-DOT has developed a very low capacity rugged digital switching system which can serve about 200 subscribers and thousand of these are in operation in the remotest areas. Equipped with the latest features like Integrated Services Digital Network (ISDN), these are capable of operating in non-airconditioned and hazardous environment. Besides, C-DOT has developed low capacity digital radio system for interconnecting rural and urban Exchanges; the cost-effective integrated switching and transmission solution by employing Time Division Multiple Access-Point-to-Multi-Point (TDMA-PMP) technique.

6. However, in reply to a specific query in this regard, DoT in a written note has contended that C-DOT switches with 16,000 ports capacity as compared to 64,000 ports of New Technology (NT) can support only 40,000 lines with 13.5% junctions as against 1,00,000 lines capacity of NT switches with 30% junctions. Also C-DOT switches occupy more space, consume higher power and require more air-conditioning compared to New Technology switches for same number of exchange line capacity, which allegedly have impact on cost and infrastructure availability.

Organisational Set-up of C-DOT

7. The management of C-DOT has a three-tier structure—the Governing Council, the Steering Committee and the Project Board. The Governing Council generally meets once in a year in the month of March to consider and adopt accounts for the preceding year and to approve the annual plan and budget for the coming year. It is chaired by the Minister of Communications. The other members of the Governing Council include eminent Scientists, Cabinet Secretary, Secretary, Department of Telecommunication, Member (Finance) and Member (Technology) of Telecom Commission, Secretary, Department of Electronic and Directors of C-DOT Project Board. The function of the Governing Council is to frame bye-laws and give Budget approval.

8. The Steering Committee's meetings are stated to be held twice in a year. In the meetings, issues like projects undertaken by C-DOT and included in the Annual Plan Document, measures to be taken to retain qualified scientists and engineers, filling up of vacancies in the Office of the Executive Director and Directors etc. are discussed. The meetings of the Project Board are held regularly every month and all matters concerning the administration and management of the Centre are discussed and dealt with by the Board. The flexibility and autonomy provided to Project Board in the C-DOT bye-laws is stated to be central to the operation of C-DOT. This feature has enabled C-DOT to effectively meet the technological challenges posed by the competitive telecom and IT environment.

9. The Committee desired to know whether any amendment has ever been made in the bye-laws of C-DOT by the Governing Council since its inception. In reply, it has been stated that the C-DOT bye-laws were amended with the approval of the Governing Council at its 27th Meeting held on 2.12.1999. Under Rule 4.1, Deputy Minister of Electronics used to act as the Vice Chairman of the Council and after the amendment, the Minister of State for Communications became Vice Chairman of the Council. Further, prior to amendment, Rule 14 of C-DOT bye-laws quotes "The appointment of the Executive Director and Directors shall be made by invitation by the Committee with the approval of the Chairman of the Council. Subject to the provision of Rule 17, the Executive Director and Directors shall normally hold office for a period not exceeding five years at a time. The emoluments, allowances and the other conditions of service shall be fixed by the Council". By the amendment the appointment of the Executive Director and the Directors shall be made with the approval of the Appointments' Committee of the Union Cabinet also.

10. Further amendment was made in Rule 24 (d) which quotes "Accounts of the Centre shall be Audited Annually by a Chartered Accountant or Accountants as defined in the Chartered Accountants" Act (XXXVIII of 1949) to be approved by the Council from the Panel of Auditors of the Comptroller and Auditor General". By the amendment in the Rule, the appointment of the Auditors of the Centre shall be approved by the Board as per the recommendations of the Comptroller and Auditor General of India. The Committee has further been informed that an amendment to Rule 5 was also made in the 28th Meeting of the Governing Council held on 27.3.2000. By the amendment in the Rule the composition of the Steering Committee was modified to include a member representing the Finance wing of the Department of Telecom.

11. The Committee learnt that C-DOT was advised as early as in 1990 to amend its bye-laws to give effect to the Government orders that all posts of the level of Joint Secretary and above had to be filled after obtaining approval of the Appointment Committee on the Cabinet (ACC). These orders were not complied with and were given effect after 7 years when C-DOT amended its bye-laws in its Board meeting held on 2.12.1999. On being enquired about the reasons for not adhering to the Government orders, it has been stated that C-DOT had amended its bye-laws only after receipt of the formal communication from DoT in July 1999.

12. It was elaborated that in June 1990, the Chairman (Telecom Commission) brought to the notice of C-DOT, a communication from the Ministry of Personnel, Public Grievances and Pension about the need to make all the appointments to posts which carried pay, in the pre-revised scale of Rs. 5300 and above with the approval of Central Government and not the Council. C-DOT has stated that they in response to the above communication had brought into the notice of the Chairman (TC) the following facts:—

(i) C-DOT bye-laws, rules and regulations were formulated in 1984 with the concurrence of Ministry of Finance and Department of Personnel.

(ii) C-DOT was autonomous in nature by virtue of the Cabinet decision for its establishment.

(iii) C-DOT rules and regulations provided total authority to its various managing bodies to appoint members of staff in different categories. For none of the appointments, either for scientists and engineers or for Directors, C-DOT is required to go to the Government of India for approval. The objective of such rules was to provide flexibility to the management to appoint appropriate personnel for organisational requirement without going through the administrative procedure of Government of India.

(iv) Similar provisions are available in Tata Institute of Fundamental Research, Bombay and Indian Institute of Science, Bangalore. In these organisations also senior level appointments are made by the Council of the Society and not by the Government of India.

(v) It would, therefore, not be in the fitness of philosophy with which C-DOT was established as an autonomous society to refer all cases of appointments with pay of Rs. 5300/- (pre-revised) and above to Government of India. Existing provisions under the bye-law, rules and regulations and Memorandum of Association of C-DOT may be continued.

13. C-DOT has further added that as no further communication was received from the Department of Telecommunications in this regard until July 1999 when DoT asked C-DOT to make appointments of Executive Director and Directors with the approval of the ACC, it appeared that the above arguments were accepted by the Department of Telecom. C-DOT accordingly made appropriate amendments to Rule 14 thereafter.

14. As to why DoT had not taken any action for contravention of Government orders by C-DOT, it has been stated in reply that considering the special status given to C-DOT to develop State-of-the-art technologies in the fast changing field of Telecom, it would be appropriate to allow the kind of flexibility given in the organisational set up of C-DOT by the Government. However, at the appropriate times the necessary amendments to the C-DOT bye-laws were made by the Governing Council in appointment and financial procedures.

15. It has further been stated that DoT has been considering to review the bye-laws in totality to reflect the changing times and Governmental instructions to make the organisation more vibrant and centre of excellence in India to meet the challenges of rapidly changing technologies in the telecom sector.

16. On perusal of the Minutes of the 27th meeting of the Governing Council which was held on 2.12.1999 to approve the accounts of the Centre for the year 1998-99, the Committee found that Member (F), DoT had expressed that some of the figures reflected in the accounts indicated a need for toning up the financial management in future. Those areas were stated to be introduction of new pay scales, payment of productivity linked bonus to C-DOT employees and method of accounting of Transfer of Technology (ToT)/Royalty on receipt basis. Subsequently those related issues were stated to be separately discussed with senior officers of C-DOT and appropriate directions were given.

17. Another constraint being faced by C-DOT is stated to be that presently, the authority to fix scales of pay, allowances and perks of the staff of the Centre vests in the Council. As the Council meets only once in a year in general, obtaining all approvals for designing various schemes to attract and retain scientific talents is bound to be time consuming. Therefore, according to C-DOT bye-law should be so amended that it vests the Authority with the Project Board to fix pay and allowance and perks in comparison to those prevailing in the IT industry.

18. The Committee appreciates that C-DOT has rendered yeoman's service to the telecom sector of our country. Switching Systems based on C-DOT technology have a large presence in the Indian Telecom Network and account for over 40% of the total lines of the network. In terms of exchanges, the share is about 90% as C-DOT technology is enjoying leading position in the rural network.

19. The Committee further notes with satisfaction that C-DOT has developed a very low capacity rugged digital switching system which can go upto 2000 subscribers and thousands of these are in operation in the remotest areas. Equipped with the latest features like ISDN, these are capable of operating in non-airconditioned and harsh environment. Besides, C-DOT has

developed low capacity digital radio system for interconnecting rural and urban Exchanges; the cost-effective integrated switching and transmission solution by employing Time Division Multiple Access-Point-to-Multi-Point (TDMA-PMP) technique. However according to Department of Telecommunications, C-DOT switches with 16,000 ports capacity as compared to 64,000 ports of New Technology (NT) can support only 40,000 lines with 13.5% junctions as against 1,00,000 lines capacity of NT switches with 30% junctions and C-DOT switches occupy more space, consume higher power and require more air-conditioning compared a New Technology switches for same number of exchange line capacity and such aspects would have impact on cost and infrastructure availability. The Committee finds ambiguity in the statements given by DoT and C-DOT in respect of C-DOT switches which requires to be clarified. The Committee expects that C-DOT would vigorously concentrate on the quality enhancement of its products/ technologies in view of the emerging competitive environment.

20. The Committee notes that C-DOT bye-laws, rules and regulations were formulated in 1984 with the concurrence of the Ministry of Finance and Department of Personnel. It further notes that C-DOT received a communication from Chairman, Telecom Commission in June, 1990 forwarding therewith a communication received from the Ministry of Personnel, Public Grievances and Pensions which directed that all the appointments to the posts which carried pay in the pre-revised scale of Rs. 5300 and above be made with the approval of the Central Government and not the Governing Council and further directed that bye-laws of the C-DOT be amended accordingly. However, these were amended only in July, 1999.

21. The Committee is concerned to note that although Department of Telecommunications felt it necessary to allow flexibility in the organisational set up of C-DOT considering the special status given to it to develop the state-of-the-art technologies, yet it directed C-DOT to make amendments to the bye-laws. It seems that Department of Telecommunications is now considering to review the bye-laws in totality ostensibly with a view to reflect the changing times and Government instructions to make the organisation more vibrant and a Centre of excellence to meet the challenges of the rapidly changing technologies in the telecom sector. The Committee is of the view that nothing may be done which will impinge on the functional autonomy of C-DOT.

Utilisation of funds

22. The Committee desired to know about the constraint, if any, with regard to availability of funds. The Executive Director, C-DOT submitted that though there was no such constraint and whatever amount they asked for had been provided by Department of Telecommunications, there was problem only in the release of funds in the month of May every year. By this practice, C-DOT has been facing difficulty in making the payment of salaries to the employees for the month of April.

23. Department of Telecommunications (DoT) explained that they get the authorisation of funds in the month of May only when budget for the year is approved by Parliament. However, there always remains a balance in the account of C-DOT and therefore there should not be any problem in the payment of the salary to the employees. It was further stated that since 1992-93 C-DOT has never been able to fully utilise funds allotted to them. During 1992-93 to 1996-97 and then in 1998-99 and 1999-2000, out of the allocation of Rs. 30 crore, Rs. 64 crore, Rs. 60 crore, Rs. 70 crore, Rs. 75 crore, Rs. 85 crore and Rs. 100 crore, C-DOT was able to utilise only Rs. 29 Crore, Rs. 60 crore, Rs. 28 crore, Rs. 40 crore, Rs. 58.5 crore, Rs. 74.75 crore and Rs. 80.97 crore respectively.

24. It was further submitted by DoT that due to under-utilisation of funds by C-DOT, Department of Telecommunications was facing difficulty to get the grants sanctioned as it was Ministry of Finance's strict instructions to see that the amount sanctioned were fully utilised. He further assured the Committee that DoT would regularise the release of funds.

25. When asked about the reasons for under-utilisation of funds during the preceding years, C-DOT in a written reply later on furnished to the Committee, has stated that the prime reason for the same was high rate of attrition in manpower because of highly lucrative offers, both within and outside the country, for trained manpower. It is not only difficult for them to recruit the best brains for a national cause but it has become next to impossible to complete the projects on time. With the attrition rate of almost 40% annually of R&D engineers most project plans had been thrown out of gear.

26. The other reason for under-utilisation of funds was stated to be that some of the critical and state-of-the-art components are not supplied by vendors of developed countries due to strategic reasons including sanctions.

27. The Committee desired to know about the steps taken/proposed by C-DOT to fully utilise the funds allocated. In a written note, it has been stated that as components and equipment required by the Centre for its R&D efforts are being identified at the commencement of the financial year itself, efforts are being made to release a single tender incorporating almost all those items, which is likely to result in large number of required components and equipment being procured and the allocated funds fully utilised. Further C-DOT is also seeking timely release of funds by DoT so that the funds allotted to them are fully utilised.

28. As regards funding to C-DOT after corporatisation of DoT, Member (Finance), DoT informed during evidence that previously funding to C-DOT was ensured through two sources. One was internal accruals *viz.* on account of royalty and the other being payments received as grants from the Government. It was stated that since the surplus of the Department of Telecommunications would now be accruing to Bharat Sanchar Nigam Limited (BSNL), therefore C-DOT would be funded by means of accruals coming into the corpus of DoT in the form of license fee, pensionary charges from Public Sector Undertakings (PSUs) etc. The shortfall if any, in funding would be met by the general exchequer. The same was stated to have been proposed to the Ministry of Finance.

29. The Committee notes that delay in release of funds to C-DOT by the DoT has been one of the reasons for under-utilisation of funds by the former. The Department of Telecommunications should ensure that there is no avoidable delay in release of funds. The Committee trusts that in future, DoT would make timely release of funds so that the work of C-DOT does not suffer.

30. The Committee regrets to note that C-DOT was not able to utilise the funds allotted to it since 1992-93. During 1998-99 and 1999-2000 also, out of the allocation of Rs. 85 crore and Rs. 100 crore, C-DOT could utilise only Rs. 74.75 crore and Rs. 80.97 crore respectively. The reasons for the under-utilisation of funds are stated to be high rate of attrition in manpower and also that some of the

critical and state-of-the-art components do not get supplied by vendors (in developing countries) due to strategic reasons including sanctions imposed by such countries. C-DOT should devise some alternative strategy to accomplish the targets. The Committee strongly recommends that C-DOT should accelerate its R&D activities to fully utilise the funds allocated to it and wherever possible, alternate suppliers should be identified to be taken recourse to, if necessary.

31. The Committee notes the contention of Department of Telecommunications that after the corporatisation of DTS/DTO, the surplus of DoT would accrue to Bharat Sanchar Nigam Limited (BSNL) and C-DOT would be funded by means of accruals coming into the corpus of DoT in the form of license fee, pensionary charges from Public Sector Undertakings (PSUs) etc. The shortfall if any would be met from the general exchequer. The Committee is of the opinion that the funding pattern of C-DOT be laid down at an early date in consultation with the Ministry of Finance to ensure that C-DOT continues to get the required funds in time and does not encounter any problem on this account.

Campus Project in Delhi

32. In view of the expanding manpower at C-DOT and the need to have state of the art facilities for research and development and also the fact that facilities are scattered at four places in Delhi, C-DOT has undertaken construction of its own campus at Delhi at the approved cost of Rs. 80 crore though the original scheme was submitted by the Architect for a tentative sum of Rs. 86.43 crore in 1994. At present facilities are located at 4 rented premises. The annual rent of these four premises during the year 1999-2000 was stated to be Rs. 2,94,99,384. During evidence, the Executive Director, C-DOT stated that a fully integrated campus would be conducive for its R&D work and would provide round-the-clock computer connectivity. The Committee has been informed that the work on the project has already started and is expected to be completed by December, 2001.

33. The Committee learnt that there was avoidable delay in the construction of the Campus building which was planned in 1994. In this context, the Committee enquired from C-DOT about the reasons for starting the construction work of the Campus Project as late as February, 1999, when Executive Director, C-DOT *vide* its letter dated 30 October, 1996 had assured Department of Telecommunications (DoT)

that the construction activities would start in April, 1997. In a written note submitted to the Committee, C-DOT has clarified that layout etc., were approved by the MCD in September, 1996. After the MCD approvals, it was expected that remaining approvals *viz.* 'No Objection Certificate' (NOC) from Chief Fire Officer, 'No Dues Certificate' from MCD (House Tax Department) and Delhi Vidyut Board (DVB) etc., would be received in early 1997 and the construction could commence thereafter in April, 1997. However, the NOC from Chief Fire Officer came in November, 1997, House Tax Department issued 'No Dues Certificate' in December, 1997, the Urban Art Commission gave approval for R&D building in March, 1998 and the MCD gave the final approval for the R&D building in March, 1998.

34. In reply to query by the Committee it has been submitted that a Campus Advisory Committee (CAC)—was constituted *vide* offers dated 18 June, 1997 and since then CAC held 37 meetings. In September, 1999 most of the bottlenecks were removed and the progress of the work was found to be satisfactory. However, a perusal of the minutes of the Campus Advisory Committee (CAC) meetings reveals that as late as August, 1997 major changes were proposed in the layout plan and Engineer-in-Chief (works) and Secretary and Convenor of CAC had cautioned the Members that with the proposed major changes, it would not be possible to meet C-DOT Board's aspirations.

35. When asked whether the revised estimates was prepared by C-DOT and how much would be the anticipated cost-escalation, it has been stated that the project was approved for Rs. 80 crores. At this stage, it would be very difficult to anticipate the exact cost escalation but is expected to be around 25% of the original approval.

C-DOT Branch Office at Calcutta

36. The Committee has been informed that the Governing Council in its 28th meeting held on 21 March 2000, requested C-DOT to work out the detailed project report and the financial implications for opening up of the Branch of C-DOT at Calcutta which may attract engineers from Eastern parts of the country to join C-DOT. On being enquired about the progress in this regard, it has been informed that the detailed project Report and the financial implications for opening up of the Branch of C-DOT at Calcutta is under preparation and will be available in the next three months.

37. The Committee appreciates that C-DOT is constructing a state of art Campus at Delhi which has been designed for fully integrated services conducive to R&D work and round-the-clock computer connectivity. At present, C-DOT facilities are located at four places in Delhi and housed in rented buildings for which it is paying a rent of Rs. 2.95 crore per annum. The Committee finds that the project envisaged as early as 1994 has been lingering on inspite of firm assurance given by the Executive Director, C-DOT to the Department of Telecom vide his letter dated 30 October, 1996. There was avoidable delay of more than 2 years in the commencement of construction which actually started in June, 1999 instead of April 1997. Delay in the commencement of work has been explained in terms of delay in getting approvals from the Municipal Corporation and other Government agencies like Delhi Vidyut Board, Fire Service and Urban Art Commission. The Committee is not at all impressed by these explanations as these statutory requirements were well known. The Committee trusts that the campus building will be completed by December, 2001 as anticipated. The Committee finds that there was not only cost and time overruns but C-DOT has to pay rentals to the tune of Rs. 2.95 crore per annum also. The whole process of construction of Campus building requires to be investigated.

38. The Committee is happy to note that C-DOT has initiated steps to open a branch at Kolkata which may attract engineers from Eastern parts of the country. The Committee would like that expeditious steps be taken in this direction and be apprised of the progress made in this regard.

Need for a basic Research Centre

39. The Committee desired to know the salient achievements in the field of telecommunications attained by the C-DOT and the extent to which it has been able to substitute foreign technology. In reply, the Secretary, Department of Telecom Operation and Member-Production stated in evidence that C-DOT has rendered yeoman's service in so far as the development of switch networking is concerned, Small exchanges used in the rural areas and made with C-DOT technology do not need any air-conditioning while all exchanges made by the Multi-National Companies required air-conditioning. So C-DOT technology is suitable for Indian conditions. Secondly, it is easy to upgrade the exchanges which are based on C-DOT technology. C-DOT

has set up small Control Centres to help DoT, whereby the life of the equipment has been prolonged. On the other hand, multinational companies charge heavily for upgradation and their equipment does not last for more than 5-10 years without upgradation. Thirdly, C-DOT equipment can be serviced and repaired in house, which is of great advantage. In the case of equipment supplied by multinational companies the same have to be sent to specialised repair centres where specialised machines and equipment is used but C-DOT equipment can be repaired and serviced in house, which is cost-effective also.

40. In reply to the Committee, the Secretary, the then DTO stated that with their experience and faith in C-DOT technology they are sure that the target of providing Village Public Telephones by 2002 would be achieved without any difficulty.

41. The Committee desired to know whether C-DOT is involved in the basic research also besides development of technology for telecom equipment. In reply, the Executive Director, C-DOT stated in evidence that the line of demarcation between research and development is very thin. Presently C-DOT is involved in development of software in which efforts involved are much higher than designing a hardware. Besides, basic research on a few times like designs, etc., was also conducted. Otherwise development of design is the function of C-DOT.

42. The Committee pointed out that since there is no limit on development of new ideas, the country should have a first class research institution involved in developing basics. The Member-Production stated that there is no dearth of brain-power in this country in the premier research institutions but it will be difficult for the Department of Telecommunications alone to support such research institute and the industry as well as others associated with telecom should come forward for setting up a premier research institution in the country.

43. Asked why C-DOT which is already involved in research and development cannot undertake initiative in this direction. The Executive Director, C-DOT submitted that C-DOT was doing research work in telecom sector only and it was not doing any research work in materials and component.

44. As regards the constraints faced by the C-DOT engineers, a representative of C-DOT submitted that while working on the ATM (Asynchronous Transfer Mode) Project, the biggest problem engineers faced was lack of electronics infrastructure for designing their own Application specific Integrated Circuits (ASICs). If they have to design ASICs which is the latest technology, they would have to go abroad for getting them manufactured.

45. It was elaborated that in Asynchronous Transfer Mode (ATM) project, they faced a lot of problems because when they designed the component, it could not be manufactured by Semi Conductors Limited (SCL) in India in its foundry because their technology was outdated and unsuitable for making complex designs. So they approached foreign firms in France and Japan who asked them to first get clearance from United States Commerce Department because it was a dual use technology. All over the world no body is willing to manufacture the required prototype for C-DOT for fear that India will use the same for military purpose.

46. The witness further submitted that basic problem was that no attention was paid to establish a foundry in India. Though it might initially seem to be expensive, yet it is clear that C-DOT should be given necessary facilities by providing them with a foundary.

47. Asked in this context, whether any exercise was ever done by DoT in this regard, a representative of Department of Telecommunications was submitted that such infrastructure would be very intensive and would cost million of dollars.

48. A representative of C-DOT explained that presently the technology being used the world over was .2 micron. In India Semi Conductors Limited (SCL) which supplies some of the requirements of C-DOT uses .8 micron technology which was in vogue in the Western countries 10 years ago. Currently, for a design that C-DOT developed, it required .25 micron technology which multinational companies refused to part with. So C-DOT had to re-design the model of the equipment in .5 micron. But by the time, the foreign companies had upgraded the technology very close to .1 micron technology. So, even though SCL was able to make certain components with the infrastructure and facilities available with it, yet for core components, it did not have the requisite technology.

49. In a subsequent note (Annexure) furnished at the instance of the Committee on setting up of indigenous basic research infrastructure to support the futuristic telecom development enlisting areas of basic research and enabling technologies for which the infrastructure is not presently available in the country, the Executive Director, C-DoT has stated that C-DoT has been working on the equipment and systems that have been required as constituents of Telecom Network and also on total solutions like Personal Communication System (PCS) and Mobile Communication based on Satellite and Radio. Further, it has been extending support to equipment based on C-DoT technology. The job involved in stated to be not only that of fabrication and manufacture of equipment but starting from operating requirements, architecture, system design, sub-system, design and in many cases development upto component and technology levels both in hardware and software. The innovation of C-DoT engineers was in the direction of developing the required basic designs, converting them to working systems which were usable and upgradable for future proof systems.

50. It has further been stated that C-DoT has to depend on outside resources for many components and basic devices both in hardware and software which require special type of development, infrastructure and facilities. The design and basic tools for equipment design, the materials, the foundries for state-of-the-art microelectronics circuits, photonics components etc. are not built in the country as it would require huge investments. Further, C-DoT has to depend on Multinational sources for certain complex and currently developed components and sub-components which are being provided by Multi National Corporation (MNC) vendors, who are also the final equipment suppliers at higher prices and there is hesitation on the part of such vendors to provide current generation technologies. Hence Government should encourage and establish the required facilities in the infrastructure sector to help indigenous applied research and development so that the state-of-the-art systems could be developed in our country.

51. C-DoT has further stated that it is very important to make R&D organisation self-reliant to support current products and for which a good part of resources should be kept aside for new developments, futuristic research and enabling technologies. The Government has to invest appropriate amount of budget on new and upcoming research and its support should continue whatever may be the status of telecom policy for operators and suppliers.

52. C-DOT has stated to have enumerated the areas of basic research for further promotion of indigenous development. They are Photonics, Reliability Studies, Materials for Telecom Divices & Customer Equipments, Microelectronics, Electromagnetic Interference, Radio Frequency (RF) Propagation, Electronic Packing & Miniaturisation, Tele-Traffic Engineering, Artificial Intelligence, Virtual Reality and Simulation, Audio, Video & Multimedia, Innovations in New Services and Applications, Software Development Tools & Techniques, Encryption, Security, Privacy & Identification and Energy Sources for Telecom. These research areas will cover a wide spectrum of diverse enabling technologies for developing telecom systems. Although some research is being conducted in a few of these fields in various academic institutions and R&D organisations, yet their research is not specific towards telecom applications and embraces only a part of the listed areas for electronic equipments and some of the defence classified applications.

53. Clarifying the position further, in a reply to a query by the Committee in this regard, the Executive Director, C-DOT stated in evidence that setting of such research Centre can not be visualized within C-DOT as it would be impracticable. There are stated to be small laboratories as in Society for Applied Microwave Electronic Engineering and Research (Sameer) or Solid State Physical Laboratory (SPL), Centre for Advanced Technology (CAT), Centre for Materials for Electronics Technology (C-MET) etc. which are having research facilities but in a minimal scale. These facilities require to be extended to cater to basic research in telecommunication areas.

54. It has been stated that once the setting up of such an infrastructure for research is agreed to in principle, the priorities and scale work to be done can be decided, depending upon availability of funds and time phases set for above objectives. The work, according to C-DOT can be carried out by enhancing the present infrastructure of different laboratories and assigning them tasks for telecom specific requirements, by extending the scope of C-DOT work and apportion adequate resources for basic research areas and by assigning to C-DOT the work of co-ordinating various research institutes existing or new ones doing work in the above mentioned areas to make C-DOT telecom products to complete globally.

55. The Executive Director, C-DOT further stated in evidence that some products under development would definitely get delayed because of non-availability of state-of-the-art foundry.

56. To another query in this regard, a representative of DOT submitted that on preliminary basis it had been found that setting up of foundry plant would cost about Rs. 4000 Cr.

57. When asked about the future role of C-DOT and the steps taken/proposed to equip C-DOT with better facilities to meet the future challenges in the telecom sector, a representative of DOT replied that as research and development would remain one of the important functions of the Department of Telecom even in the revised dispensation *i.e.* after corporatisation of the DOT, C-DOT has been placed under the administrative charge of the Department of Telecommunications. C-DOT will have a more important role to play as technological changes are taking place in a very rapid manner.

58. The Committee enquired as to what new role/strategy is contemplated to be undertaken to face the challenges posed by liberalisation process in the field of Telematic Technology. C-DOT in reply stated that prior to changes in the telecom environment, C-DOT's technology was modelled on delivering technology solutions for monopoly network operator *i.e.* the DOT, by licensing its technology to public and private sector entrepreneurs who then manufactured and marketed products to DOT. C-DOT then collected the royalty on the marketed products. In the changed telecom environment, the monopoly operation has been replaced by multiple competitive operators, most of whom are private sector entrepreneurs.

59. It has further been stated that since huge investment is required to create telecom infrastructure, most private entrepreneurs have tied up with foreign partners who would prefer procurement of telecom equipment from their own sources rather than from C-DOT equipment manufacturers as a result of which market of C-DOT within the country is likely to shrink.

60. While discussing the future role of C-DOT in the post liberalized era and also after corporatisation of DOT, Member (Finance), DOT submitted during evidence that in the coming years C-DOT would have a more important role to play because of the opening up of the telecom sector and since technological changes have been taking place in a very rapid manner. There would be enough scope for product development though there would not be much of scope for basic research. It was added that the product development has to be done in such a manner that it matches the needs of the customers. They would all be looking up to C-DOT for product development, for designing, new software systems because C-DOT is the premier enterprise in this area.

Export Potentialities

61. The quality of C-DOT switching equipments is states to be of world standard. However, these could not be exported in large number. The Committee desired to know the reasons which have hindered the export potential. In reply, Department of Telecommunications in a note has stated that one of the reasons is non-availability of financial package to take up turnkey projects, which has resulted in loss of very good opportunities in Colombia and Costa Rica.

62. To a query whether any market survey had ever been conducted by C-DOT so as to ascertain potential areas where its products could be exported, C-DOT has replied in the negative. Reports on the world requirements are brought out by reputed market research organisations like PYRAMID research, CIT etc. According to them, most of the market potential exists in Asia, Africa and Latin America. As a result, C-DOT, Telecom Consultant of India Limited (TCIL) and some of the C-DOT equipment manufacturers have concentrated on Vietnam, Nepal and Bangladesh in Asia, a number of African Countries and Colombia and Costa Rica in Latin America.

63. As regards strategies in export of telecom technologies developed in India, Department of Telecommunications has stated that they already have set up a Focus Action Group (FAG) to suggest strategies on Export of Telecom. FAG has already identified several lines of credit available for export of Indian goods (including Telecom) to various countries and circulated the same to Telecom Equipment Manufacturing Association/Public Sector Undertaking (PSUs) of DOT engaged in such activities.

High Attrition

64. The Committee desired to know about the constraints if any, which are faced by C-DOT. In reply, the Executive Director, C-DOT submitted that the biggest problem faced by them was high rate of attrition of their manpower even though C-DOT has been trying their level best to provide them with challenging jobs to persuade them stay. C-DOT has state-of-art facilities in several areas which are comparable with the available elsewhere. Though there is lot of keenness to join C-DOT, after three or four years, the engineers get allured to much better terms elsewhere.

65. In a written reply furnished to the Committee it has been informed that as regards measures taken by C-DOT to combat brain-drain, within the provisions of Government regulation, C-DOT has attempted improvements in the perks offered to its engineers. However, the marginal increases in remuneration offered by C-DOT to its engineers have been insufficient to stop brain-drain. Therefore, C-DOT has appointed a consultant to go through Industry remuneration patterns and suggest possible improvements to remunerations in C-DOT so that the same could be made at par with other IT organizations in the country.

66. The Executive Director, C-DOT further supplemented during evidence that they had engaged a consultant from Faculty of Management, New Delhi who has already submitted his Report which covers the entire range of financial package, including pay scales, perquisites and favoured the information of productivity liked incentive so that young people may have greater motivation to perform better. Department of Telecommunications (DoT) is stated to be looking at the entire range of options. It was assured that they would make every possible endeavour to see that a better financial package emerges is provided to the engineers so that at least for six to seven years the young recruits stay with the organisation.

67. The Committee finds that the Centre for Development of Telematics (C-DOT) is primarily engaged in design and development of various types of components and software equipment for telecommunications and basic research has been an insignificant part of its activities. The C-DOT equipment suits Indian conditions and are comparatively economical, easy to handle, easily repairable and rugged in design. Its performance has been highly appreciated by the Department of Telecommunications. However, in its endeavour to design and develop various critical components, C-DOT has been facing certain difficulties as it has no backup facilities like a research centre to support its activities. On occasions, when it designed certain break-through equipments, they had to go abroad for development of prototypes as such facilities available in the country are not of the required standard. For example, when integrated circuits of 0.1 micron were designed, C-DOT could not get the same tested and developed anywhere in the world as the companies which have foundries refused to do so due to sanctions imposed on the country considering that the equipment may be used for defence purposes. This has retarded growth of indigenous design and development in the telecommunications. Even though Semi Conductors Ltd., at Mohali near Chandigarh has facilities for development of integrated circuits, yet the technology used is comparatively obsolete and not of the required standard.

68. The Committee finds that C-DOT has to depend on outside resources for electronic infrastructure both in hardware and software though there is no dearth of talent in the country. According to well informed sources there are 30% Indian engineers and scientists in the premier research institutions all over the world. All the technologically leading countries in the world *viz.* USA, France, UK, Germany, Japan and Sweden have set up foundries to meet their requirements. The basic design and basic tools for equipment design, the materials, the foundries for state-of-the-art microelectronics circuits, photonics components etc. are not built in the country as they would require huge investments. The Committee strongly is of the view that Government should encourage and establish these facilities in the country in order to use them as support to indigenous applied research and development so that the state-of-the-art systems could be developed much faster. Though initially such basic component and technology research may not be commercially viable yet it is worth venturing as it will not only make the country self-reliant, but C-DOT will also turn profitable when both telecom and other electronic systems start using these facilities and resource part of their requirements for global activities. A target must be laid urgently and initial steps taken in this direction even though exact facilities may be set up at a later date. Our country should not lag behind any other in this regard. Since setting up of the infrastructure involves huge investments in foundry and research facilities, the Committee strongly recommends that a due share of turnover of telecom and electronics industries should be earmarked to facilitate early establishment of these facilities. Department of Telecommunications should also on its part devise means to invest appropriate amount from the budget in new and upcoming research.

69. The Committee notes that Photonics, Reliability Studies, Materials for Telecom Devices & Customer Equipments, Microelectronics, Electromagnetic Interference, Radio Frequency (RF) Propagation and Electronic Packaging & Miniaturisation are some of the important areas for basic research development in telecommunications. Some other fields like Tele-Traffic Engineering, Artificial Intelligence, Virtual Reality and Simulation, Audio, Video & Multimedia, Innovations in New Services and Applications, Software Development Tools & Techniques, Encryption, Security, Privacy & Identification and Energy Sources for Telecom are other important research areas. These research areas cover a wide spectrum of diverse technologies for developing telecom systems. The

Committee also notes that although some research is already going on in some of these fields in various academic institutions and R&D organisations, yet their research is not specific towards telecom application and embraces only a part of the listed areas for electronic equipment and some of the defence classified applications. Therefore, the Committee strongly recommends that the Government should take a lead for providing appropriate modern infrastructure in the fields mentioned above with a view to playing a leading role in the emerging technologies in telecom all over the world and providing state of the art facilities. The Committee is of the opinion that availability of such facilities within the country will give ample opportunities to young scientists of take up challenging research projects within the country. Though this would entail substantial investment initially, yet the benefits accruing out of it over a period of time would be far greater. In the emerging scenario, the country cannot afford to lag behind and be dependent upon others in critical areas of technology.

70. The Committee observes that so, far, modest facilities have been made available by setting up small institutions like Society for Applied Microwave Electronics Engineering and Research (SAMEER), Centre for Materials for Electronics Technology (C-MET), Solid State Physical Laboratory (SPL), Centre for Advanced Technology (CAT) etc. It is therefore, imperative that either the present infrastructure of different laboratories is enhanced and they are assigned telecom specific tasks on increasing scale or some new research institutions are established to perform this task. The Committee is of the opinion that in the changing scenario when the technological developments are taking place at an extremely fast rate India can not afford to wait to access basic research. Setting up of the full-fledged Research Centre will also shift focus from development to research which will be more rewarding in the long run. With our vast intelligent manpower which is available at much cheaper rate, the country is well positioned to exploit the situation, if timely moves are made in this direction. The Committee, therefore, strongly recommends that Department of Telecommunications should initiate immediate steps to set up a Research Centre/foundry in the country to cater to the needs of telecommunication/microelectronics. Such Centre will provide the much needed opportunities to young talents in the country.

71. The Committee appreciates that C-DOT has planned to take its technology to the global market and it has been participating in various International exhibitions to highlight its product range and solutions in the global market. As these steps have met with limited success, it has further planned to lay greater stress to market its products in the global markets in the coming years. The Committee desires C-DOT to continue its efforts in this direction. The Committee, therefore, recommends that C-DOT should tap its expertise on adaptability of products for other developing countries who are in the process of upgrading their telecom network.

72. The Committee notes with satisfaction that there is ample scope for export of C-DOT products/technologies to Africa, Latin America and Asia. However, one of the reasons mentioned for lower level of export is the non-availability of finance. The Committee also notes that Department of Telecommunications has set up a Focus Action Group (FAG) to suggest strategies on Export of Telecom. Further, FAG has already identified various lines of credits available for export of Indian goods (including Telecom) to various countries and circulated the same to Telecom Equipment Manufacturing Association/Public Sector Undertakings (PSUs) of DoT engaged in such activities. The Committee is not sure whether the line of credit exclusively for export of telecom equipments is adequate. The Committee would like the DoT to examine details in this regard and take appropriate steps to ensure that financial constraints do not pose any constraint in export of telecom equipments.

73. The Committee further recommends that in order to accelerate export of telecom equipments, yearly targets should be fixed and DoT should monitor the same on periodic intervals. Suitable incentives should also be provided to increase the export potential. The Committee is of the view that mere identification of the line of credit and circulating the same to Telecom Manufacturing Association/Public Sector Undertakings (PSUs) of DoT engaged in such activities would not serve the purpose unless monitoring is done regularly. If need be, a separate cell in DoT/C-DOT should be set up exclusively for promoting export of telecom equipments.

74. The Committee notes that C-DOT appointed a Consultant to go through the Industry remuneration pattern and suggest possible improvements in remuneration paid in C-DOT to technical personnel so that the same could be at per with other IT organisations in the country. Since the Consultant has already submitted a report, the Committee desires that its recommendations are processed and implemented expeditiously and the Committee be apprised of it within three months.

Tender Enquiry for Procurement of C-DOT MAX-L/XL Exchanges

75. C-DOT Manufacturers Association submitted a representation to the Committee on Tender Enquiry No. MM/SW/022000/000196 which was opened on 13.6.2000 for procurement of 22.1 lakhs lines of C-DOT Main Automatic Exchanges-Large/Extra Large (MAX-L/XL exchanges) against the placement of Purchase Order with a Multi National Corporation (MNC) for Large (L) and Extra-Large (XL) exchanges which were stated to be reserved for C-DOT Manufacturers. It is alleged that DoT has been purchasing medium and large capacity switching equipments from MNCs and several times, orders for L and XL exchanges, which were reserved for C-DOT, had been placed with MNCs. It is complained that DoT had been allowing the MNCs to enjoy a larger market share inspite of their high prices. A comparative statement showing price position of C-DOT exchanges *vis-a-vis* MNC technology switches since 1992-93 is given as Under:—

	1992-93	1993-94	1995-96	1997-98	1998-99	1999-2000	2000-2001
C-DOT	2500-4000	1700-3500	1300-3500	1200-3400	1200-3400	1200-3400	1200-3300
MNC	3900	4100	7800*	5356	5600	4400	1989

(Price per line ranging from Rs. 1200 to Rs. 3300 is in respect of 256 Port RAX to MAX-XL)

*(DoT places order @ 5600 per line after negotiation).

76. It has been submitted that an order of 16.57 lakh lines has been issued to C-DOT Manufacturers against the tender enquiry of 22.10 lakh lines, after a cut of 25% in the tendered quantity. The balance quantity of 5.53 lakh lines are proposed to be given to MNCs. It was submitted that deliberate attempt was made to eliminate C-DOT technology even in areas where equipment upto 10,000 lines has been reserved for C-DOT. The manufacturers contended that they had procured imported and indigenous material to meet delivery commitments and had been carrying substantial inventory with them to meet this commitment.

77. Reacting to the submissions of C-DOT manufacturers at the instance of the Committee, the then Department of Telecom Operations (DTO) in a note has stated that a total of 58 lakh lines MAX-I equipment requirement (34 lakh lines C-DOT MAX-L/XL exchange, 23 lakh lines of new technology equipment and 1 lakh lines of E-10B equipment) was estimated for the year 2000-2001 as per expected demand for various technologies and a tender for 65% of 34 lakh lines *i.e.* 22.1 lakh line of C-DOT MAX-L/XL was floated and opened in June, 2000 but later on requirement of C-DOT was found to be only 25.5 lakh lines besides 31.5 lakh lines of new technology equipment and 1 lakh lines of E-10B equipment and hence 25% reduction had to be made in tender quantity of C-DOT equipment by invoking the clause No. 25 of Section-II of the bid document and new technology quantity had to be increased. Apart from this, the DTO stated that vendors were not able to supply the ordered equipment within the stipulated delivery period and they were unable to supply the ordered equipment during 1997-98, 1998-99 and 1999-2000.

78. The DTO added that the C-DOT MAX-L/XL switches are having the following technological shortcomings:

(a) The ultimate capacity of the C-DOT MAX-XL switches is only 40K as compared to new technology switches, which can grow upto 100 K. lines.

(b) The C-DOT switches occupy larger space, consumes higher power as well as its air-conditioning requirement is more.

(c) The switch can support only 3,00,000 Busy Hour Call Attempts (BHCA) whereas the new technology switches can cater upto 8,00,000 BHCA. Although C-DOT has developed switch with 8,00,000 BHCA, it is not yet cleared by TEC due to some defects.

(d) C-DOT MAX-L/XL switches do not support the features such as X.25 connectivity and Ring back service etc.

(e) C-DOT equipment manufacturers are not able to supply the ordered equipment within the stipulated delivery period.

79. The DTO had further stated that a policy decision has already been taken that the exchanges upto 10K lines will be of indigenous technology of C-DOT, and the DTO had been following the same. The DTO also denied that purchase orders for L/XL exchanges were placed on MNCs. In fact, it contended that the C-DOT switches have increased from 11.5 lakh lines in 1992-93 to 38 lakh lines in 1999-2000. The delivery period was relaxed by two months and purchase orders were likely to be placed during October, 2000.

80. Asked in this context, the Executive Director, C-DOT in a note has submitted as follows:

(a) Ultimate capacity of C-DOT MAX-XL switches is 40,000 lines while MNC switches can grow upto 100K lines.

With the availability of V5.2 functions, C-DOT exchanges can grow well beyond 40,000 lines and by using Wireless Access Networks (V5.2 functions allow connecting Wireless Access Network) a capacity of about 60,000 lines can be achieved. The C-DOT also stated that the requirement for an ultimate capacity of 1 lakh lines has been introduced without due consultation with C-DOT, although C-DOT was expecting to be consulted. However, C-DOT in its next release of system, which will go into commercial production in 12 months time is expected to provide the possibility of connecting 1 lakh subscribers. The prototypes of the system is stated to have already been developed.

(b) C-DOT switches occupy larger space etc.

C-DOT has replied that C-DOT exchanges fully met the specifications regarding space and power. Line Card for C-DOT rural and C-DOT urban exchanges was common, which is unique to C-DOT exchanges and has several advantages and has greately facilitated maintenance of exchanges in the network.

(c) C-DOT switch can support only 3,00,000 BHCA whereas MNC exchanges can support 8,00,000 BHCA.

Although C-DOT had developed switch with 8,00,000 BHCA, but was not yet cleared by TEC due to some defects. It was thus factually incorrect, since TEC had already approved switch with 8,00,000 BHCA *vide* their letter No. TBSW/C-DOT-MAX-XL/99-TEC, dated 16th September, 1999. Moreover, several C-DOT exchanges of 8,00,000 BHCA are already working in the network.

(d) C-DOT MAX-L/XL switches do not support X. 25 connectivity.

C-DOT replied that X-25 protocol which was introduced globally in 1980s has been superseded by the internet (Transmission Control Program/Internet Protocol) TCP/IP and its usage and topical relevance is negligible, considering the recent technological trends. Ring back, which is used only for checking the volume of ring is available in C-DOT exchanges, though the manner of its implementation may differ slightly.

(e) C-DOT equipment manufacturers are not able to supply the ordered equipment.

C-DOT has further submitted that prior to the year 1999-2000, 6 months delivery time was given to both C-DOT and MNCs, but during 1999-2000 alone, the delivery time was reduced to 4 months for C-DOT equipment only which created problems for the manufacturers to supply the ordered quantity. In fact, C-DOT manufacturers had reportedly responded well to the requirements of the Department and the supply was increased by more than 50% over preceding years during 1998-99 and 1999-2000. Details of despatches of switching equipment has also been submitted.

81. Further, C-DOT has informed that the 'new technology exchanges' have a lot of defects but still the Department has introduced a number of such exchanges. These are also priced higher than C-DOT exchanges. The DTO would have saved a massive amount of Rs. 1,420 crore from the year 1994 to the year 2000 had the Department made all the procurements from C-DOT vendors. Only four months back, a MTNL tender elicited price of Rs. 3,600 per line from MNC technology vendors. The drop in the prices quoted in the tender enquiry in question (Rs. 1989 per line) was stated to be too dramatic in too short a time to be caused by any real drop in the cost of inputs. C-DOT has further submitted that in fact, MNCs have been trying to get rid of accumulated inventories and were trying to damage the indigenous technology manufacturing base of the country.

82. The Committee asked DOT to justify their earlier statement in the light of observations made by the Executive Director, C-DOT. In reply, the DTO reiterated their earlier stand and explained that C-DOT MAX XL switches had been validated for 800,000 BHCA by Telecom Engineering Centre. The material list supplied by C-DOT against the tender for the year 2000-01, however, did not include 800,000 BHCA capability because the maximum size of the exchanges to be supplied by the manufacturers was only 8000 lines.

83. The Committee notes with regret that the then Department of Telecom Operations (DTO) has placed orders with Multi National Corporations (MNCs) for Large (L) and Extra (XL) exchanges, inspite of their availability indigenously. The same is stated to be done on the ground (a) the ultimate capacity of the C-DOT MAX-XL switches is only 40K as compared to new technology switches, which can grow upto 100 K lines; (b) the C-DOT switches occupy larger space, consumes higher power (c) its air-conditioning requirement is more (d) the C-DOT switch can support only 3,00,000 Busy Hour Call Attempts (BHCA) whereas the new technology switches can cater upto 8,00,000 BHCA and although C-DOT has developed switch with 8,00,000 BHCA, it is not yet cleared by TEC due to some defects. Further C-DOT MAX-L/XL switches do not support the features such as X.25 connectivity and Ring back service etc. and finally C-DOT equipment manufacturers are not able to supply the ordered equipment within the stipulated delivery period.

84. However C-DOT controverting these assertions in para No. 83 apprised the Committee that the requirement for an ultimate capacity of 1 lakh lines has been introduced without due consultation with it. C-DOT in its next release of system, which will go into commercial production in 12 months time, will be providing the possibility of connecting 1 lakh subscribers and the prototypes of the system have already been developed. Further C-DOT contended that its exchanges fully meet the specifications regarding space and power. Line Card for C-DOT rural and C-DOT urban exchanges in common, which is unique to C-DOT exchanges and has several advantages and has greatly facilitated maintenance of exchanges in the network. C-DOT has stated in to be factually incorrect statements that although C-DOT had developed switch with 8,00,000 BHCA, it was not yet cleared by TEC due to some defects and that C-DOT MAX-L/XL switches do not support X.25 connectivity. Further TEC has already approved C-DOT switch with 8,00,000 BHCA and C-DOT exchanges of 8,00,000 BHCA are stated to be already working in the network and X.25 protocol which was introduced globally in 1980s has been superseded by the internet Transmission Control Programme/Internet Protocol (TCP/IP) and its usage and topical relevance is negligible, considering the recent technological trends. Ring back, which is stated to be used only for checking the volume of ring is available in C-DOT exchanges, though the manner of its implementation may differ slightly. C-DOT has finally controverted

the statement of DTO that C-DOT equipment manufacturers are not able to supply the ordered equipment by stating that prior to the year 1999-2000, 6 months delivery time was given to both C-DOT and MNCs, but during 1999-2000 alone, the delivery time was reduced to 4 months for C-DOT equipment only which created problems for the manufacturers to supply the ordered quantity. The Committee has been informed that subsequently it was increased to 8 months. In fact, C-DOT manufacturers have stated to have responded adequately to the requirements of the Department and the supply has been increased by more than 50% over preceding years during 1998-99 and 1999-2000.

85. The Committee is not convinced by the reason given by DoT for placing the Purchase Order for Large (L) and Extra Large (XL) exchanges with a Multi National Corporation (MNC) valued at Rs. 549.4 crore which were reserved for C-DOT. The Committee further notes that ultimate capacity of C-DOT MAX-XL of 1 Lakh lines has been introduced without consultation with C-DOT. The Committee considers it to be a serious lapse. It does not find any acceptable reason for favouring MNCs at the cost of C-DOT manufacturers and recommends a proper enquiry to be made by a high authority (not connected with the tendering process) as may be appointed by the Ministry of Communications into the matter.

NEW DELHI;
16 *March*, 2001
25 *Phalguna*, 1922 *(Saka)*

SOMNATH CHATTERJEE,
Chairman,
Standing Committee on
Information Technology.

SETTING UP AND ENHANCING OF INDIGENOUS BASIC RESEARCH INFRASTRUCTURE TO SUPPORT FUTURISTIC TELECOMMUNICATION DEVELOPMENT

1.0 C-DOT Research & Development

1.1 C-DOT is presently working on equipments and systems those are required as constituents of telecom network. The equipment includes that required for subscriber Access, Switching, Transmission and Network Management portions of the telecommunication network. Apart from these systems, C-DOT is also working on total solutions like PCS & Mobile communications based on both Satellite & Radio. C-DOT is extending support to software projects of DOT and field support to the equipment based on C-DOT technology, installed and working in the network. These systems have been designed by C-DOT without technology transfer from any other organisation and have been built based on specifications and requirements of the network operators and international standards. The job involved is not only that of fabrication and manufacture of the equipment but of starting from operating requirements, architecture, system design, sub-system design, and in many cases development up to the component and technology levels both in forms of hardware and software. The technologies & systems so developed are transferred parallely to multiple manufactures through comprehensive documentation & proven prototypes. On similar lines, C-DOT has plans to meet the future requirements of expanding network set to provide more and more innovative subscriber services of high quality & lower costs.

1.2 Although, C-DOT does not design materials, and all the enabling technologies termed as pure research/fundamental research items required for telecom systems development yet, the present working of C-DOT can be listed in the category of Applied Research & Development for specific requirements. The technologies in electronics and telecommunications are changing very fast. C-DOT engineers have not only to keep abreast of technological developments in the world but also have to anticipate the development and the new technologies coming up in future. The innovation of C-DOT engineers are in the direction of developing the required basic designs, converting them to working systems which are productionizable, usable and upgradable as future proof systems.

2.0 Dependence on Outside Resources & Infrastructure

2.1 C-DOT has to depend on outside resources for many components and basic devices both in hardware and software domains, which require special type of development infrastructure and facilities. Setting up of these facilities indigenously are generally perceived to be feasible in terms of commercial and economic viability only if the requirement is universal and in large volumes as well as the same satisfies immediate requirements. The design and basic tools for equipment design, the materials, the foundries for state-of-the-art microelectronic circuits, photonics components etc., are some of examples of the basic technologies, which have still not been built in the country. These require huge investments.

2.2 C-DOT for some of the complex and currently developed components and sub-components has to depend upon Multinational sources for which one has to pay either higher price or there are IPR issues. Many of these components are provided by such vendors, who are also the final equipment suppliers. This results in hesitation on the part of these vendors to provide current generation technologies.

3.0 Setting up and Enhancing of Indigenous basic Research Infrastructure

3.1 It is necessary that some of above said facilities are encouraged and established in the Infrastructure sector by the Government with a view to use them as support to indigenous applied research & development. Once these facilities are made available, the state-of-the-art systems can be realized much faster & the iteration time can be reduced resulting in shorter development cycles. India can become active and contributing partner in global revolution. Initially, such basic component and technology research departments may not be commercially profitable but by the time both telecom and other electronic systems start using these facilities and part resources are also utilised for global activities, the profitability of such projects can begin.

4.0 Financial Model

4.1 It has become imperative with time that R&D organisations have to become self reliant to support current products, still in any model of R&D institution, it is very important that a good part of the resources are kept aside for new developments, **futuristic research and enabling technologies.**

4.2 The products working in the field & those getting installed, their upgradation & value addition can cater financially to the development of the ongoing products. The Government has to invest appropriate amount of budget on new and upcoming research. No centre of R&D excellence can be a profit centre from the very beginning when it is catering to overall development with a national mission. The Government support has to continue whatever may be the status of telecom policy for operators and suppliers. This is necessary when there is practically no investment on telecom R&D by indigenous industry.

5.0 Areas of Basic Research & Enabling Technologies

5.1 The following areas of basic research are important for further promotion of indigenous telecommunication development:

5.1.1. Photonics

The importance of Photonics and opto-electronics is very obvious with growing demand of high volume information transfer. Optical fibre systems have become core transport technology both in access and distance transmission. The research areas of focus include Optical fibers and special fibres for amplifiers, Local area networks for ultra low loss transmission, Lasers for high speed communication systems and for reading and writing of CD-ROMS Data Storage for optical memories, Optical Imaging including pattern recognition, Optical computing including neural networks and image processing are other areas of study. Photonic switching, high bandwidths inter-connects for parallel processors Integrated optical components like combiners, filters, Optical Amplifiers both conventional & Raman, CAD tools for Photonics, Optical waveguides, Micro-electromechanical systems & devices, Fibre Grating technology, Opto-electronic packaging and Fiber based devices in form of couplers, filters and splitters are new technologies to be focussed for use in telecommunications.

The research in photonic areas would require computers and software for modelling of the devices, transducers like opto-electronic converters for studying the parameters, the packaging techniques for encapsulation of the devices and characterisation instruments apart from fabrication facilities with high quality cleanrooms.

5.1.2. Reliability Studies

Reliability Studies shall benefit all areas of Industry in the country, including Telecom. The activity shall involve advanced work in the area of Reliability modelling/simulation, testing, statistical methods including design and experiments using orthogonal array techniques and very importantly, Software Reliability. Software development for telecom applications, is very significant and demands a high share of resources, efforts and time. Research efforts in the area of Software Reliability can yield Development Methodologies/Models, Validation, Measurements and Failure Analysis tools that can have far reaching impact on productivity and reliability.

Reliability studies are also an indispensable part of the foundation over which country's electronic components industry can stand. Both, for passive components and state of the art Very Large Scale Integration (VLSI) semiconductor devices, a quantum jump in our capabilities in the field of components is not possible without due attention to the field of Reliability Engineering.

5.1.3 Materials for Telecommunication Devices & Customer Equipments

The research areas relating to material sciences for telecom applications may include study & realisation of high frequency and microwave materials like microwave substrates, laminates, epoxies, ferrites, materials for microwave integrated circuits like hybrids and monolithic microwave integrated circuits. The materials research would also include electronic packaging materials, RF substrates which have appropriate dielectric constants & dissipation factors. Some of the important materials to be studied and worked upon include Teflon fiberglass, Microfibre teflon, Alumina substrates, Quartz substrates, RT duriods, Wire bonding materials, MMIC single wafers for all passive and active components, Thermal conduction and insulating materials, materials with special properties for microelectronic devices. Materials for customer terminals resulting in light weight and environment proofing are important for mobile services.

5.1.4 Microelectronics

Modern Telecom System use microelectronics as core enabling technology. It is believed that by the year 2002, more than 100 million transistors would be realisable on a single chip thus making SOC (System on Chip) a reality. C-DOT, as an innovator would be interested in designing and developing niche, robust and cheap telecom technology solutions. The key areas of microelectronics research can be broadly categorised as two major areas namely Front End Design & Development which focuses on Computer Aided Design (CAD) of microelectronics devices while the other area is Backend Design fabrication & associated technology.

Front End Design & Development

There is strong need for research in development of Hardware/ Software CAD tool development for detailed analysis on optimal partitioning of complex systems in terms of cost complexity and effort. This essentially includes research areas to develop fast prototyping means for complex telecom system using VLSI (Very Large Scale Integration) implementations with the use of System/behavioural/RTL synthesis and simulations, use of Fabless design Flows and devices, Re-configurable architecture design options with a stress on Hardware/ Software Co-Design methodology. There is a further need of having innovative research in the area of optimal design of high speed data-path, Control and Memory architecture. Microelectronics must assist in realising cheap, power efficient and robust telecom systems. Work on Mixed Signal & RF MIC devices on a single chip and behaviour in terms of jitter, noise, crosstalk, signal integrity etc. is also very important.

'At speed Test' methodology including BIST (Built in Self Test). Cost effective Test, Verification and Validation for both digital and analog designs are other key research areas for development of robust telecom microelectronics devices.

Backend Design fabrication & associated technology

Microelectronics device realisation is dependent on fabrication and associated process technology. In the modern world of Deep Sub Micron (DSM) VLSI design for microelectronics, there is a need for comprehensive study and research of silicon process technology and interconnect analysis. This facility is highly lacking in the country.

C-DOT requires to have expertise in physical designs for DSM technology. Research must include Modelling of interconnects, silicon library development associations, Mask making and advanced lithography techniques, process technology and layout models for minimisation of silicon for physical design.

Research studies and efforts are desired for realisation of process technology for SOI (Silicon on Insulator), Si-Ge (Silicon Germanium) and advanced GaAs technology. Research on MCM (Multi Chip Module) and WSI (Wafer Scale Integration) are required to have more integration of VLSI systems. On Chip Circuit packaging, pin packaging and modelling are other important research areas.

5.1.5. Electromagnetic Interference, Radio Frequency (RF) Propagation, Electronic Packaging & Miniaturisation

Electromagnetic Interference radiation, device miniaturisation and related packaging technologies are very important for upcoming wireless access equipments, user devices and other subscriber held equipments. EMI/EMC research includes tools, equipments and instruments to measure the radiations, software tools and transducers for modeling the EMI pattern models for grounding, filtering and shielding. Equipments and models for computing and measuring Electro Static Discharges (ESD) as well as RF leak detectors for radio frequency are important areas.

Modelling of atmospheric turbulence and interference affecting the propagation of radio frequencies, spectrum related propagation studies, diversity modelling are necessary and to be carried out. Transducers for measurement of factors affecting the propagation and electro-magnetic field modelling are some other areas for propagation studies.

The packaging areas to be focused for miniaturisation include CAD software packages for miniature component sub-systems and sub-assemblies. Study on materials for handling parameters important for customer mobile equipment including EMC, ESD, Thermal effects, Weight (Mobility), Movement in hazardous environment, Human safety factors, Cost, Volume production and subscriber friendly handling of these devices needs lot of attention. In this area, the tools are also required to be strengthened for three dimensional simulation of such devices and methodologies for rapid prototyping. The testing and behaviour of such equipments and packaging in actual environment has to be studied simulating such conditions.

5.1.6 Tele-Traffic Engineering

The world of telecommunication is undergoing a paradigm shift. With the increasing role of the Internet and high bandwidth services in determining the traffic mix and service offerings, the telecom companies need to re-look at the manner in which the network is engineered and managed.

One of the very significant areas of fundamental research in telecommunications is that of Traffic Engineering, which concerns the most efficient allocation of limited network resources among users. Theoretical work needs to be taken up in this area in order to generate new network architectures/topologies and algorithms for call admission control, multiple access, bandwidth allocation, routing QOS (Quality of Service) control, congestion control and overload handling. Work on network protocols, network simulation tools for fixed and mobile, narrow band and broad band networks is also required.

5.1.7 Artificial Intelligence, Virtual Reality & Simulation

This area along with knowledge engineering and databases has great potential to have a lot of impact on telecommunications. There are several areas, which are inter-related and would be enabling innovative telecommunication services. Work needs to be done in the area of Neural Networks, Associative rules based engines, Expert systems, Knowledge engineering, Data mining and Data warehousing.

Research work on artificial intelligence to extrapolate scenarios and to predict behavioural patterns have a great bearing on how services are made available to subscribers and how resources are dramatically configured and utilised. This area will have a great impact on the future services provided by Telecommunications. Work also relates to provide environment & technologies for virtual meetings, virtual conferences, Tele-medicine, Tele-education, Tele-presence services.

Simulation studies are another very important area. These studies simulate the actual behaviour of the system in near real scenarios. This additional knowledge would help to engineer the products for the field and for better resource planning by simulating the actual environment.

5.1.8 Audio, Video and Multimedia

Audio, Video and Multimedia research is one of the most promising sector required for telecom service provisioning. Signal processing and control for access and transmission of audio, video and multimedia and integrated broadband networks are the techniques which have to be studied and developed. The techniques & studies relating to algorithms, compression, for bandwidth efficient designs of picture graphics and video leading to services like telepresence, image engineering, language engineering, available bit rate and specified bit rate multimedia service algorithms, switching and transportation protocols and methodologies, short and long term prediction coding schemes, intelligent opto-electronic displays for video and multimedia, multimedia data handling, storage, forwarding, play back buffers, document storage and compression in hardware and software models are new areas of study. Multimedia packet control systems, management techniques for multimedia friendly virtual paths and network layers, optimal coding and security, optical are some of other areas of work.

5.1.9 Innovations in New Services and Applications

With the opening up of Telecom sector and new Telecom Policy, there has been intense competition among different service providers for basic, mobile and internet services.

Customers in future will demand and create services of their choice from Application Service Providers (ASPs).

India to compete globally in the new Millennium, has to give thrust to innovative services development that effectively and efficiently meet the requirements of both the Indian masses and global society. Work is in progress for future generation of innovative services like Tele-presence and Virtual Reality but many more of such services will have to perceived and modelled along-with necessary upgrading of the network.

5.1.10 Software Development Tools & Techniques

Indian software industry has earned itself a remarkable reputation worldwide. However, we need automation that is required to deliver first-time-right (quality) software. The developed countries have devised formal techniques of developing software and are in the process of perfecting the tools for automation, including Computer Aided Software Engineering (CASE) tools. In order to develop complex quality software, research would have to be enhanced in the following areas:

Formal Description Techniques for formal software languages and graphical representation for expressing the specifications of the system under design, reusable libraries for software that can be reused under different software development scenarios, code generation tools for automatically generating source code, test software generation tools, validation and verification software generation tools, parallel processing systems software.

Languages and compilers are also needed for devising such processes, procedures and tools of developing software that will result in quality software independent of the ability and skills of an individual software developer.

5.1.11 Encryption, Security, Privacy and Identification

The security technology and the corresponding cyber laws are the key aspects of success of e-revolution. Presently, almost all of the security solutions are based on foreign technologies and there are virtually no indigenous solutions for either network security or the content security. This costs huge amounts of license fee and an outflow of foreign exchange and dependence. Moreover, the security achieved through the foreign technology always carries a risk of foreign deciphering. C-DAC and IISC have started indigenous technology development in this area. A serious integrated indigenous effort is necessary. Research work may be done towards development of the following areas, namely, Algorithm for encryption/decryption with key length suitable for the security needs, digital signature generation and distribution and authentication mechanism. Other areas of research for commercial transactions include secure electronic communication, transaction and payment mechanism with domestic entities playing roles of certificate authority and payment gateway, the system techniques/data access and authorization through with IP Sec and tunneling capability apart from other standard features of filtering etc.

5.1.12 Energy Sources for Telecom

Lack of reliable sources of energy often constrains deployment of Telecom in remote/rural areas. Non-conventional sources of energy offer great promise for such area. Basic research is required to address the issues of sources of energy and the means to effect energy savings in the area of Telecom. This can be a part of the larger national project on the non-conventional energy sources.

Non-conventional sources of energy, storage and conservation can be listed as three broad areas for research. Basic research is required for large scale production of solar arrays and systems with better conversion efficiency and reduced costs for remote and inaccessible areas. Apart for photovoltaics, fuel cells using biogas or organic fuels wind generators and micro hydro electric generators also hold great promise and require further research.

Telecom installations use batteries to bridge the gap in the availability of main source of power. Basic research in the area of battery materials and processes is required to develop batteries most suited to Indian conditions. These should be able to give better useful lives and higher energy/volume ratios. With accent on mobile applications, handheld terminals are assuming greater importance today. Basic research on batteries for user portable devices is also important. Research is required for energy efficient solutions for Telecom, especially, those related to the control of environmental (air-conditioning, ventilation, illumination, etc.) for telecom installations.

6.0 Conclusion

6.1 The research areas selected above cover a wide spectrum of diverse enabling technologies for developing telecommunication systems. In a few of these fields some research work is already going on in various academic institutions and R&D organizations like SAMEER, Solid State Physical Laboratories (SPL), Centre for Advanced Technologies (CAT), Centre for Development of Materials (C-MAT) and CEERI, Pilani etc.

However, their research is not specific towards telecom applications but embraces only a part of the listed areas both for electronics equipment and some of the defence classified applications. Once the above approach of setting up of such an infrastructure is agreed in principle, the priorities and scale of work to be done can be decided, depending upon availability of funds and time phases set for above objectives. The work can be carried in the following way:

* Enhance the present infrastructure of different laboratories and assign them tasks for telecom specific requirements.
* Extend the scope of C-DoT work and apportion adequate resources for basic research areas.
* C-DoT may be assigned the work of coordinating various research institutes existing or new ones doing work in above areas to make C-DoT telecom products to compete globally.

ACRONYM/ABBREVIATION OF TERMS USED IN THE REPORT ON "WORKING OF CENTRE FOR DEVELOPMENT OF TELEMATICS (C-DoT)"

A.C.C.	—	Appointment Committee of the Cabinet
A.T.M.	—	Asynchronous Transfer Mode
B.H.C.A.	—	Busy Hour Call Attempts
B.S.N.L.	—	Bharat Sanchar Nigam Limited
C.A.C.	—	Campus Advisory Committee
C.A.T.	—	Centre for Advanced Technology
C.C.S.T.	—	Common Channel Signalling No. 7
C-DoT	—	Centre for Development of Telematics
C.M.E.T.	—	Centre for Materials of Electronics Technology
DoT	—	Department of Telecommunications
D.T.O.	—	Department of Telecom Operations
D.V.B.	—	Delhi Vidyut Board
F.A.G.	—	Focus Action Group
I.N.	—	Intelligent Network
I.S.D.N.	—	Integrated Services Digital Network
I.T.	—	Information Technology
M.A.X.-L/X.L.	—	Main Automatic Exchange—Large/ Extra Large
M.C.D.	—	Municpal Corporation of Delhi
N.I.T.	—	Notice Inviting Tender
N.T.	—	New Technology
P.C.S.	—	Personal Communication System
P.S.Us	—	Public Sector Undertakings
R.A.X.	—	Rural Automatic Exchange
R&D	—	Research and Development
R.F.	—	Radio Frequency
S.A.M.E.E.R.	—	Society for Applied Microwave Electronic Engineering and Research
S.C.L.	—	Semi Conductors Limited
S.D.H.	—	Synchronous Digital Hierarchy
S.P.L.	—	Solid State Physical Laboratory
T.C.P./I.P.	—	Transmission Control Programme/ Internet Protocol
T.D.M.A.-P.M.P.	—	Time Division Multiple Access-Point-to-Multi Point
T.E.C.	—	Telecom Engineering Centre
ToT.	—	Transfer of Technology

APPENDIX I

MINUTES OF THE TWENTY-FOURTH SITTING OF THE STANDING COMMITTEE ON INFORMATION TECHNOLOGY (1999-2000)

The Committee sat on Tuesday, 1 August, 2000 from 1500 hours to 1715 hours in Committee Room 'D', Parliament House Annexe, New Delhi.

PRESENT

Shri Somnath Chatterjee—*Chairman*

MEMBERS

Lok Sabha

2. Shri Mahendra Baitha
3. Shri Pawan Kumar Bansal
4. Shri Nikhil Kumar Chaudhary
5. Dr. C. Krishnan
6. Shri Bhartruhari Mahtab
7. Shri K.A. Sangtam
8. Shri Vinay Kumar Sorake

Rajya Sabha

9. Shri Balkavi Bairagi
10. Dr. Y. Radhakrishna Murthy
11. Shri K. Rama Mohana Rao
12. Shrimati Kum Kum Rai

SECRETARIAT

1. Dr. A.K. Pandey — *Additional Secretary*
2. Shri S.K. Sharma — *Deputy Secretary*
3. Shri A.S. Chera — *Under Secretary*

Representatives of Department of Telecom Operations

1. Shri R.N. Goyal	—	Secretary, DTO
2. Dr. Vijay Kumar	—	Member (T)
3. Shri N.P. Dhamania	—	Advisor (T)
4. Shri S.P. Purwar	—	Advisor (F)
5. Shri S.D. Saxena	—	Sr. D.D.G. (TCF)

Representatives of C-DoT

1. Shri K.N. Gupta	—	Executive Director
2. Shri Vijay Madan	—	Director
3. Shri P.K. Bhatnagar	—	Director
4. Shri Y.K. Pandey	—	Director
5. Dr. U.K. Mishra	—	General Manager
6. Shri Jayant Bhatnagar	—	Divisional Manager

2. At the outset, the Chairman welcomed the Secretary, Department of Telecom Operations, Executive Director, C-DoT and other officials accompanying them.

3. The Executive Director, C-DoT gave a presentation on the working of Centre for Development of Telematics (C-DoT). The Committee then sought certain clarifications from him and also from other officials of Department of Telecom Operations and C-DoT. The representatives responded to the queries of the Members.

4. The Chairman further desired the Executive Director, C-DoT to furnish a note to the Committee on setting up and enhancing of indigenous basic research infrastructure to support futuristic telecommunications development in the country. The Executive Director, C-DoT promised to furnish the same.

5. A verbatim record of the sitting has been kept.

The Committee, then adjourned.

APPENDIX II

MINUTES OF THE THIRTY-FIFTH SITTING OF THE STANDING COMMITTEE ON INFORMATION TECHNOLOGY (1999-2000)

The Committee sat on Tuesday, 31 October, 2000 from 1500 hours to 1700 hours in Committee Room 'D', Parliament House Annexe, New Delhi.

PRESENT

Shri Somnath Chatterjee—*Chairman*

MEMBERS

Lok Sabha

2. Shri Mahendra Baitha
3. Prof. Dukha Bhagat
4. Shri Tara Chand Bhagora
5. Shri Nikhil Kumar Chaudhary
6. Adv. Uttamrao Dhikale
7. Shri K.K. Kaliappan
8. Dr. C. Krishnan
9. Shri Bhartruhari Mahtab
10. Shri Sheeshram Singh Ravi
11. Shri K.A. Sangtam
12. Shri Saroj Tufani
13. Rajkumari Ratna Singh
14. Shri Vinay Kumar Sorake

Rajya Sabha

15. Shri Balkavi Bairagi
16. Shri Shatrughan Sinha
17. Dr. Y. Radhakrishna Murthy
18. Shri Kartar Singh Duggal
19. Shri R.N. Arya
20. Shri K. Rama Mohana Rao
21. Shrimati Kum Kum Rai
22. Shri Rajiv Shukla

SECRETARIAT

1. Shri S.K. Sharma — *Deputy Secretary*
2. Shri A.S. Chera — *Under Secretary*

Representatives of the Department of Telecommunications (DoT)

1. Shri A. Prasad — Member (F),
2. Shri R.N. Goyal — Member (P)
3. Dr. Vijay Kumar — Member (T)
4. Shri N.R. Mokhariwale — Member (S),
5. Dr. D.P.S. Seth — C.M.D., BSNL

Representatives of Centre for Development of Telematics (C-DoT)

1. Shri K.N. Gupta — Executive Director
2. Shri Vijay Madan — Director (Transmission)
3. Shri Y.K. Pandey — Director (Systems)
4. Shri P.K. Bhatnagar — Director (Switching)
5. Dr. U.K. Mishra — General Manager (Civil)

2. At the outset, the Chairman welcomed the Members of Telecom Commission, Executive Director, C-DOT and other Officials of DoT and C-DOT to the sitting of the Committee.

3. The Committee sought clarifications on the issues relating to the subject "Working of C-DOT" and the representatives of DoT and C-DOT responded to the queries of the Members.

4. The Chairman thanked the representatives of Department of Telecommunications (DoT) and C-DOT for furnishing valuable information to the Committee and for expressing free and frank views on various points raised by the Members.

5. A verbatim record of the sitting has been kept.

The witnesses then withdrew and the Committee adjourned.

APPENDIX III

MINUTES OF THE THIRTEENTH SITTING OF THE STANDING COMMITTEE ON INFORMATION TECHNOLOGY (2001)

The Committee sat on Tuesday, 13 March, 2001 from 16.00 hours to 17.25 hours in Committee Room 'C', Parliament House Annexe, New Delhi.

PRESENT

Shri Somnath Chatterjee — *Chairman*

MEMBERS

Lok Sabha

2. Shri Pawan Kumar Bansal
3. Shri Nikhil Kumar Chaudhary
4. Shri T. Govindan
5. Shri K.K. Kaliappan
6. Shri Bhartruhari Mahtab
7. Shri Simranjit Singh Mann
8. Shri Saroj Tufani
9. Rajkumari Ratna Singh
10. Shri Vinay Kumar Sorake
11. Shrimati D.M. Vijaya Kumari
12. Shri G. Ganga Reddy

Rajya Sabha

13. Shri Balkavi Bairagi
14. Shri Narendra Mohan
15. Dr. Y. Radhakrishna Murthy
16. Shri Munavvar Hasan
17. Shri K. Rama Mohana Rao
18. Shrimati Kum Kum Rai
19. Dr. Dasari Narayana Rao

SECRETARIAT

1. Shri S.K. Sharma — *Deputy Secretary*
2. Shri A.S. Chera — *Under Secretary*

2. The Committee took up for consideration the Draft Eighteenth Report on 'Working of Centre for Development of Telematics (C-DOT)' and adopted the same with amendments/modifications as shown in Appendix IV.

3. The Committee then authorised the Chairman to finalise the draft Report in the light of the factual verification and present/lay the Report in both the Houses of Parliament.

The Committee then adjourned.

APPENDIX IV

MODIFICATIONS/AMENDMENTS MADE BY THE COMMITTEE IN THE DRAFT EIGHTEENTH REPORT

Page No.	Para No.	Line No.	For	Read
1	2	3	4	5
7	20	4	"forwarding"	"forwarding therewith"
7	20	4 (from below)	"Centre"	"C-DOT"
7	20	2 (from below)	"delete"	
			"The Committee would like-Governing Council"	
7	21	1	"perturbed"	"concerned"
7	21	6	"allegedly"	"ostensibly"
9	30	2 (from below)	After: "sanctions"	
			Add: "imposed by such countries"	
10	31	2	"after the corporatisation-—accruing"	"after the corporatisation of DTS/DTO the surplus of DoT would now accrue"
12	37	5 (from below)	"excuses"	"explanations"
12	37	5 (from below)	"anticipated"	"known"

1	2	3	4	5
12	37	2 (from below)	"cough up"	"pay"
12	38	2 (from below)	"The Committee-- --steps taken"	"The Committee would like that expeditious steps be taken"
19	67	2 (from below)	"at Chandigarh"	"at Mohali near Chandigarh"
20	68	9-10	"The Committee-- -view of C-DOT"	"The Committee strongly is of the view"
20	68	9 (from below)	"part resources"	"resource part of"
20	69	3	After "Propagation	Add "and"
20	69	3	After "Miniaturisation"	Add "are some of the important areas for basic research development in telecommunications. Some other fields like"
20-21	69 (Cont.)	7	"some of the— telecommunications"	"some other important research areas."
21	69 (Cont.)	8	"are covering"	"cover"
21	69 (Cont).	6-7 (from below)	"so that in the world"	"and providing state of the art facilities"
21	69 (Contd.)	1-2 (from below)	"to be lagging and dependent"	"to lag behind and be dependant"
21	70	6	"tests"	"tasks"

1	2	3	4	5
21	70	12	"her"	"our"
21	70	12	"our"	"the"
22	70 (Cont.)	2 (from below)	"electronics"	"microelectronics"
22	72	3	After: "reasons"	Add "mentioned"
22	72	1-2 (from below)	"a serious problem"	"any constraint No. 83"
23	74	last line	Add: at the end:	"within three months".
27	83 (Cont.)	4	"pretext"	"ground"
27	-do-	14	"allegations"	"assertions given in para No. 83"
27	84	7	"C-DOT developed"	"C-DOT had developed"
27	84	8	After: "and"	Add "that"
27	84	9	Delete: "as"	Add "Further"
28	84 (Cont.)	3 (from below)	After: "ordered quantity."	Add "The Committee has been informed that subsequently the delivery time was increased to 8 months."
28	85	3	After: "(MNC)"	Add "valued at Rs.
28	85	34	Delete:	"thereby making equipments"