# DIGITAL SWITCHING - I

**PROF. YATINDRA NATH SINGH**
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**INTENDED AUDIENCE :** Students, Teachers, Professionals, Trainers, Leaders, Employers

**RE-REQUISITES :** Preferably should have done Basics of Digital Communications, and Digital Communication Networks.

**INDUSTRIES APPLICABLE TO :** There is no industry support. The course will be useful to the people from telecom industry.

## COURSE OUTLINE

The course will introduce the learners to basics of digital telephony. It will start with crossbar switch and move to theory of switches. Towards end, packet switching basics will be looked into.

## ABOUT INSTRUCTOR

Prof. Yatindra Nath Singh, Department of Electrical Engineering Indian Institute of Technology, Kanpur, He did his B.Tech Electrical Engineering from REC Hamirpur (Now NIT Hamirpur), and M.Tech in Optoelectronics and Optical Communications from IIT Delhi. He was awarded Ph.D for his work on optical amplifier placement problem in all-optical broadcast networks in 1997 by IIT Delhi. In July 1997, he joined EE Department, IIT Kanpur. He was given AICTE young teacher award in 2003. Currently, he is working as professor. He is fellow of IETE, senior member of IEEE and ICEIT, and member ISOC. He has interests in telecommunications' networks specially optical networks, switching systems, mobile communications, distributed software system design. He has supervised 11 Ph.D and more than 115 M.Tech theses so far. He has filed three patents for switch architectures, and have published many journal and conference research publications. He has also written lecture notes on Digital Switching which are distributed as open access content through content repository of IIT Kanpur. He has also been involved in open source software development. He has started Brihaspati (brihaspati.sourceforge.net) initiative, an open source learning management system, BrihaspatiSync a live lecture delivery system over Internet, BGAS general accounting systems for academic institutes.

## COURSE PLAN

**Week 1 :** Introduction, Basic signaling, Strowger exchange, crossbar, crossbar operation algorithm.

**Week 2 :** Call congestion and time congestion; Lee's approach, Karnaugh's approach

**Week 3 :** Strictly Non-blocking networks, Rearrangeably non-blocking networks; Clos Network; Paull's matrix; Clos theorem; Strictly non-blocking for f-way multicasting.

**Week 4 :** Slepian Duguid theorem, its proof; Paull's theorem; Recursive construction; Crosspoint complexity for rearrangebly and strictly non-blocking networks

**Week 5 :** Cantor network; proof; Wide-sense non-blocking network – example network and proof.

**Week 6 :** Packet Switching, Buffering strategies, Input Queued Switch, Output Queued switch

**Week 7 :** Banyan Networks, Delta Network, Shufflenet as Delta network – proof.

**Week 8 :** Buffered Banyan network (buffering at each switching element), Computional analysis.