

ABSTRACT

Modelling of telecommunications access networks which concentrate traffic is essential for architectural studies, design and operational efficiency. This work develops the concept of an Intermediate Services Access Network (ISAN) that represents an enhanced narrowband synchronous transfer mode access network which provides an evolutionary step from the existing POTS and N-ISDN access networks to the Fibre to the x (FTTx) networks. Models of the ISAN are developed to support architectural and traffic studies. Generic components are identified from a study of several typical ISAN network architectures. The components include intelligent nodes, transmission links and exchange interfaces. The modelling methodology used seeks firstly to identify resources in the access network and then model them as object classes. Entity-Relationship diagram techniques, defined by the International Telecommunications Union, are used in this work to identify, decompose and represent components in an access network. Recurring components in this work are termed generic components and have attributes that make them reusable. The classes developed consist of generic classes, and technology or application specific classes. Software classes are developed to represent traffic sources with selectable parameters including Poisson arrivals, negative exponential or lognormal holding times and asymmetric originating and terminating models. The identified object classes are implemented using the object-oriented simulation language MODSIM III. An existing unidirectional ring network is simulated to quantify the traffic performance of this type of network under telephone traffic conditions. The ring network is further developed to enhance traffic capacity and performance under link failure conditions. As an economic consideration, this hypothetical ring network uses a single backup link in the event of link failure. The network is simulated with different types of types of traffic (telephone, payphone and Internet dial-up traffic) and under link failure conditions to establish the grade of service.