

Book Reviews

W. Stallings

ISDN and Broadband ISDN with Frame Relay and ATM, Fourth Edition

Prentice Hall, Upper Saddle River, NJ, 1999, pp. xviii+542, ISBN 0-3-973744-8

William Stallings is a well-known consultant and lecturer in the area of data communications and computer networking, and at the same time a prolific technical writer authoring an impressive collection of very popular professional reference books and textbooks on the most relevant aspects of communications-related topics. In fact, these books are so popular, achieving a large number of editions, so as to compel the publisher to include them in the separate The William Stallings Books on Computer and Data Communications *Technology series*.

The book *ISDN and Broadband ISDN with Frame Relay and ATM* is devoted to presenting an in-depth description of the technology and architecture of integrated services digital networks (ISDN) including integrated digital networks (IDNs), ISDN services, architecture, the signaling system No. 7 (SS7) as well as a coverage of the relevant ITU-T recommendations. It is intended to provide a comprehensive technical survey of the protocols and architecture of ISDN and B-ISDN, including a detailed examination of frame relay and ATM. In comparison to the previous one, this Fourth Edition brings an expanded coverage of ATM services and traffic control, updated treatment of ATM Forum specifications along with new subject matter on digital subscriber line (DSL) technologies.

The book consists of 16 chapters grouped in 5 Parts, two appendices, an extensive Glossary with 89 entries, a References list with 102 items and an Index. Each chapter includes problems and suggestions for further reading.

The opening Chapter 1 offers some historical background matter and the rationale for the introduction of ISDN and B-ISDN, stressing the interaction of computers and communications, and outlines the overall structure of the book.

Part I: *Digital Communications Fundamentals*, consisting of three chapters on some 80 pages, gives a concise exposure of the fundamental technologies of IDNs thus securing self-containment of the book. Particular topics being treated include those on the basics of digital transmission, on subscriber line technology, line coding techniques and present DSL solutions and on switching and signaling techniques for communication networks.

Part II: *Integrated Service Digital Networks* delves into ISDN proper and comprehends 7 chapters on more than 200 pages of text. In the first of them a general description of the architecture of ISDN is offered, with topics on IDN, a conceptual view on ISDN and a comprehensive list of ITU-T recommendations that define ISDN. Follows the chapter on ISDN interfaces and functions featuring a deeper consideration of the multiplexed transmission structure, ISDN user-network interface configurations and the protocol architecture, as well as issues of addressing and interworking with other network types. The chapter on ISDN physical layer explores in detail both the basic and the primary user-network interface along with the relative subscriber loop issues needed to support ISDN. The chapter on ISDN data link layer describes the LAPD protocol supporting transmission of higher-layer control signaling information, and the I.465/V.120 procedure for supporting non-ISDN-terminals. The chapter on ISDN network layer elaborates on the network protocols - Q.931 for managing network connections at the ISDN user-network interface, and Q.932 for invocation and operation of supplementary services. Specific services provided by ISDN, which support existing voice and data applications as well as provide for future ones,

are described in the following chapter. Finally, a chapter is devoted to the Signaling System Number 7, the ISDN common-channel signaling standard.

Part III: *Frame Relay*, which totals two chapters of about 60 pages, describes the basic issues of frame relay, the service and switching mechanism which was originally conceived for ISDN, but has subsequently established itself as a streamlined packet switching technique. The first of the chapters covers key elements of frame relay, including the protocol architecture, a comparison with X.25, and the particular frame relay data link control protocol LAPF. The second chapter elaborates on congestion control issues.

Broadband ISDN is explained on the 40 pages of Part IV's two chapters. Chapter 14 describes the standards, services, requirements and the architecture of B-ISDN. Chapter 15 describes the reference model, with special attention given to the physical layer and SONET/SDH.

The final Part V: *Asynchronous Transfer Mode* illustrates in its 80 pages ATM (or cell relay), the transmission technique using fixed-size cells thus having less overhead than frame relay and operating at significantly higher data rates. Chapter 16 covers the ATM protocol (layer 2 in the ATM protocol stack), the transmission of ATM cells over both a cell-based and an SDH-based physical layer, and the ATM adaptation layer (AAL - layer 3 in the ATM protocol stack). Chapter 17 provides information on ATM traffic and congestion control, service categories, and traffic management.

The book's two Appendices bring additional material on flow control, error detection and error control, and on the OSI Reference Model, respectively.

As already stated, *Stalling's ISDN and Broadband ISDN with Frame Relay and ATM* is at its fourth edition. As such, it has been refined several times already and in the present edition it presents a very good treatment of the subject matter, which has moreover been constantly updated. Its concise style without too much wordiness as well as the very technical overview of the subject matter with a plethora of precise information makes it an extremely useful reference book.

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ATM. Foundation for Broadband Networks, Vol. I, Second Edition

Prentice Hall PTR, Upper Saddle River, NJ, 1999, pp. xviii+446, ISBN 0-13-083218-9

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ATM. Signaling in Broadband Networks, Vol. II

Prentice Hall PTR Upper Saddle River, NJ, 1998, pp. xv+191, ISBN 0-13-571837-6

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ATM. Internetworking with ATM, Vol. III

Prentice Hall PTR, Upper Saddle River, NJ, 1998, pp. xvi+236, ISBN 0-13-784182-5

Here is another publishing effort by Uyles Black, the best-selling author and renowned communications consultant. It is a boxed set of three books covering the presently hot topic of ATM technology, which is by the many considered as the ultimate solution to WAN and LAN networking. This three-part suite, titled *ATM Resource Library*, is of course a part of Prentice Hall's Series in Advanced Communications Technologies, featuring Black as the author.

The first book in the set - *Volume I* - is intended to be a complement to the Series' flagship book *Emerging Communications Technologies*. This Second Edition reflects the changes that have taken place since the publication of the first one. The chapters have been updated, with new or revisited topics like

voice over ATM with AAL2, ABR (Available Bit Rate) and UBR (Unspecified Bit Rate) procedures, updated MIBs and network management, internetworking and tunneling with IP, inverse multiplexing, and protection switching. The book consists of 15 chapters, a list of 91 references, a list of abbreviations, and an index.

The opening chapters deal with a short review of mostly introductory matter, including a description of the present telecommunication infrastructure, the concept of virtual networks, fast relay networks and ATM. The nature of analog and digital systems is also explained, along with layering concepts paving the way for ATM and SONET networks and an outline of "emerged" (i.e. already well-established) technologies.

Follow the core chapters, totally devoted to the subject of the book, about 350 pages of detailed text. Specific topics described comprise the broadband ISDN (B-ISDN) model, ATM basics, and a deeper discussion of the ATM Adaptation Layer (AAL). Other aspects covered include ATM switching operations, traffic control and congestion control, call and connection control, internetworking with ATM networks, as well as a survey on SONET which is providing the physical layer for ATM networks. There is also a chapter on ATM network management operations (OAM) and one devoted to considerations on the ATM market.

Volume II is the companion book devoted to signaling both at UNI (User-Network Interface) and NNI (Network-Network Interface). It outlines newly released specifications on this topic, together with a detailed description of the "broadband" signaling specification implying ATM as the foundation for broadband networks. The book is composed of 11 chapters, with the accompanying lists of references (82 items) and abbreviations, and the index.

The first five chapters introduce the topics of signaling systems, ISDN and B-ISDN, ATM and Signaling System Number 7 (SS7) architecture, and addressing in broadband signaling networks. The remaining chapters examine in more detail the signaling ATM adaptation layer (SAAL) with the associated sublayers, the ATM signaling operations at the UNI, the Broadband ISDN User Part (B-ISUP) as one of the key applications in broadband signaling networks, and operations between UNI and NNI. In addition, some other broadband signaling operations

and performance requirements here including the Private Network-Network Interface (PNNI) are reviewed, too.

The third book in the set - *Volume III* - deals with the integration of ATM technology into already existing ones like Frame Relay, Ethernet and Token Ring LANs, and IP-based internets and intranets. The book comprises 11 chapters, 3 Appendices, plus the usual Abbreviations, Other References and Index.

After a general introduction, encapsulation and address mapping as well as the basic operations of ATM/Frame Relay interworking are explained. Follow the chapters on the operation of Data Exchange Interface (DXI) and Frame User Network Interface (FUNI) for end-user equipment, ATM Forum's Network Interworking specification for transmission between Frame Relay systems and Service Interworking specification for transmission between Frame Relay and ATM systems, and an introduction to LAN Emulation (LANE). The subsequent chapters elaborate on the service specification and Protocol Data Units (PDUs) for the former four sets of service specification, and on the LANE housekeeping operations including LANE configuration, client and server registration and the LANE NNI (LNNI).

The book ends with a chapter on the Next Hop Resolution Protocol (NHRP) to correlate Non-Broadcast Multi-Access (NBMA) and layer 3 addresses, and another one of Multiprotocol over ATM (MPOA). The three appendices bring material on the basics on interworking, addressing conventions, and LANE parameters.

By writing the *ATM Resource Library Uyless* Black carried out a significant effort in providing the working professional with updated and detailed information on ATM technology, which is considered the future prevailing one. The subject matter is covered so as to furnish the newest possible standards in the area, thus furnishing a lot of valuable data. As it is usually the case with such category of books, these ones are certainly the companions to have on the shelf near the desk.

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