

BAB VI

PENUTUP

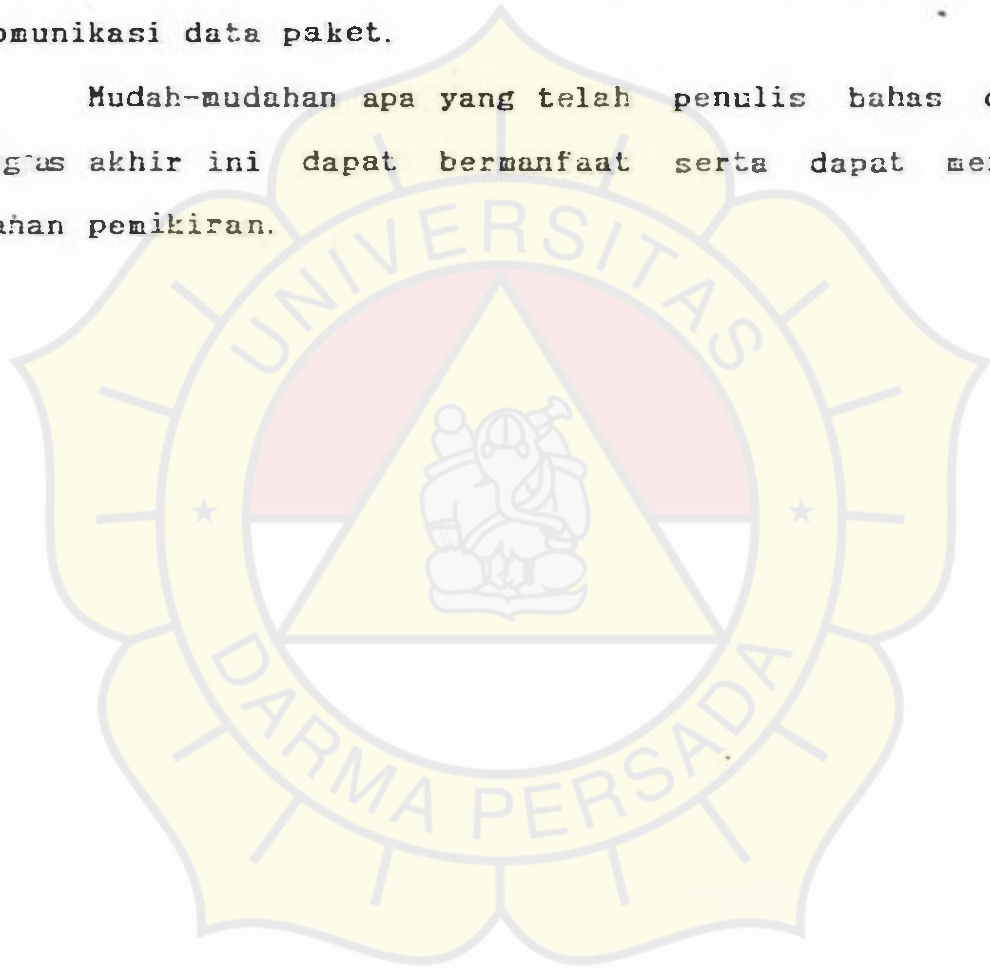
Setelah melakukan pembahasan-pembahasan pada bab - bab sebelumnya dan disertai dengan analisa teknis dan perhitungan maka, hasilnya dapat disimpulkan sebagai berikut:

1. Perolehan akhir dari nilai (C/N) yang dicari untuk transmisi data paket dari Medan ke Surabaya adalah:
 - (C/N) Medan - Jakarta :12,75 dB
 - (C/N) Jakarta - Surabaya :15 dB
 - (C/N) total Medan -Surabaya :11,05 dB
2. Dengan menggunakan nilai C/N yang telah diperoleh tersebut, selanjutnya dipergunakan untuk mencari S/N. Dari S/N ini besarnya kapasitas kanal didapat sebesar: 1.434.000 bit.
3. Dengan menggunakan harga C/N tersebut, besarnya Bit Error Rate didapat sebesar : 0,999.999,956, sedangkan Probabilitas kesalahan bit yang timbul karena Thermal Noise didapatkan sebesar: $4,4 \times 10^{-8}$ Karena standard PB untuk VSAT oleh CCITT adalah 10^{-7} , maka dengan nilai yang diperoleh tersebut telah sesuai dengan nilai yang ditentukan.
4. Perhitungan jumlah terminal yang mampu dilayani oleh Metoda akses Aloha, untuk komunikasi data paket didapat sebesar: 53 terminal.
Dengan hasil tersebut selanjutnya dapat digunakan

untuk membuat jaringan komunikasi data dengan menggunakan VSAT. Apabila jumlah terminal akan ditambah maka panjang paket harus dikurangi.

Demikianlah beberapa kesimpulan yang dapat ditarik dari pembahasan-pembahasan serta analisa teknis dari pemanfaatan VSAT atau SKSBM dalam mendukung operasi komunikasi data paket.

Mudah-mudahan apa yang telah penulis bahas dalam tugas akhir ini dapat bermanfaat serta dapat menjadi bahan pemikiran.



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Tabel C=1. Tabel fungsi kesalahan (error function).

z	erf (z)	z	erf (z)	z	erf (z)	z	erf (z)
0.00	0,000 000	0.50	0,520 500	1.00	0,842 701	1.50	0,966 105
0.01	0,001 283	0.51	0,529 244	1.01	0,846 810	1.51	0,967 277
0.02	0,022 565	0.52	0,537 899	1.02	0,850 838	1.52	0,968 413
0.03	0,033 841	0.53	0,546 464	1.03	0,854 784	1.53	0,969 516
0.04	0,045 111	0.54	0,554 939	1.04	0,858 650	1.54	0,970 586
0.05	0,056 372	0.55	0,563 323	1.05	0,862 436	1.55	0,971 623
0.06	0,067 622	0.56	0,571 616	1.06	0,866 144	1.56	0,972 628
0.07	0,078 858	0.57	0,579 816	1.07	0,869 773	1.57	0,973 603
0.08	0,090 078	0.58	0,587 923	1.08	0,873 326	1.58	0,974 547
0.09	0,101 281	0.59	0,595 936	1.09	0,876 803	1.59	0,975 462
0.10	0,112 463	0.60	0,603 856	1.10	0,880 205	1.60	0,976 348
0.11	0,123 623	0.61	0,611 681	1.11	0,883 533	1.61	0,977 207
0.12	0,134 758	0.62	0,619 411	1.12	0,886 788	1.62	0,978 038
0.13	0,145 867	0.63	0,627 046	1.13	0,889 971	1.63	0,978 843
0.14	0,156 947	0.64	0,634 586	1.14	0,893 082	1.64	0,979 622
0.15	0,167 996	0.65	0,642 029	1.15	0,896 124	1.65	0,980 376
0.16	0,179 012	0.66	0,649 377	1.16	0,899 096	1.66	0,981 105
0.17	0,189 992	0.67	0,656 628	1.17	0,902 000	1.67	0,981 810
0.18	0,200 936	0.68	0,663 782	1.18	0,904 837	1.68	0,982 493
0.19	0,211 840	0.69	0,670 840	1.19	0,907 608	1.69	0,983 153
0.20	0,222 703	0.70	0,677 801	1.20	0,910 314	1.70	0,983 790
0.21	0,233 522	0.71	0,684 666	1.21	0,912 956	1.71	0,984 407
0.22	0,244 296	0.72	0,691 433	1.22	0,915 534	1.72	0,985 003
0.23	0,255 023	0.73	0,698 104	1.23	0,918 051	1.73	0,985 578
0.24	0,265 700	0.74	0,704 678	1.24	0,920 505	1.74	0,986 135
0.25	0,276 326	0.75	0,711 156	1.25	0,922 900	1.75	0,986 672
0.26	0,286 900	0.76	0,717 537	1.26	0,925 236	1.76	0,987 190
0.27	0,297 418	0.77	0,723 822	1.27	0,927 514	1.77	0,987 691
0.28	0,307 880	0.78	0,730 010	1.28	0,929 734	1.78	0,988 174
0.29	0,318 283	0.79	0,736 103	1.29	0,931 899	1.79	0,988 641
0.30	0,328 627	0.80	0,742 101	1.30	0,934 008	1.80	0,989 091
0.31	0,338 908	0.81	0,748 003	1.31	0,936 063	1.81	0,989 525
0.32	0,349 126	0.82	0,753 811	1.32	0,938 065	1.82	0,989 943
0.33	0,359 279	0.83	0,759 524	1.33	0,940 015	1.83	0,990 347
0.34	0,369 365	0.84	0,765 143	1.34	0,941 914	1.84	0,990 736
0.35	0,379 382	0.85	0,770 668	1.35	0,943 762	1.85	0,991 111
0.36	0,389 330	0.86	0,776 100	1.36	0,945 561	1.86	0,991 472
0.37	0,399 206	0.87	0,781 440	1.37	0,947 312	1.87	0,991 821
0.38	0,409 009	0.88	0,786 687	1.38	0,949 016	1.88	0,992 156
0.39	0,418 739	0.89	0,791 843	1.39	0,950 673	1.89	0,992 479
0.40	0,428 392	0.90	0,796 908	1.40	0,952 285	1.90	0,992 790
0.41	0,437 969	0.91	0,801 883	1.41	0,953 852	1.91	0,993 090
0.42	0,447 468	0.92	0,806 768	1.42	0,955 376	1.92	0,993 378
0.43	0,456 887	0.93	0,811 564	1.43	0,956 857	1.93	0,993 656
0.44	0,466 225	0.94	0,816 271	1.44	0,958 297	1.94	0,993 923
0.45	0,475 482	0.95	0,820 891	1.45	0,959 695	1.95	0,994 179
0.46	0,484 655	0.96	0,825 424	1.46	0,961 054	1.96	0,994 426
0.47	0,493 745	0.97	0,829 870	1.47	0,962 373	1.97	0,994 664
0.48	0,502 750	0.98	0,834 232	1.48	0,963 654	1.98	0,994 892
0.49	0,511 668	0.99	0,838 508	1.49	0,964 898	1.99	0,995 111

z	erf (z)	z	erf (z)	z	erf (z)	z	erf (z)
2.00	0,995 322	2.50	0,999 593	3.00	0,999 971 91	3.50	0,999 999 257
2.01	0,995 525	2.51	0,999 614	3.01	0,999 979 26	3.51	0,999 999 309
2.02	0,995 719	2.52	0,999 634	3.02	0,999 980 53	3.52	0,999 999 358
2.03	0,995 906	2.53	0,999 654	3.03	0,999 981 73	3.53	0,999 999 403
2.04	0,996 086	2.54	0,999 672	3.04	0,999 982 86	3.54	0,999 999 445
2.05	0,996 258	2.55	0,999 689	3.05	0,999 983 92	3.55	0,999 999 485
2.06	0,996 423	2.56	0,999 706	3.06	0,999 984 92	3.56	0,999 999 521
2.07	0,996 582	2.57	0,999 722	3.07	0,999 985 86	3.57	0,999 999 555
2.08	0,996 734	2.58	0,999 736	3.08	0,999 986 74	3.58	0,999 999 587
2.09	0,996 880	2.59	0,999 751	3.09	0,999 987 57	3.59	0,999 999 617
2.10	0,997 021	2.60	0,999 764	3.10	0,999 988 35	3.60	0,999 999 644
2.11	0,997 155	2.61	0,999 777	3.11	0,999 989 08	3.61	0,999 999 670
2.12	0,997 284	2.62	0,999 789	3.12	0,999 989 77	3.62	0,999 999 694
2.13	0,997 407	2.63	0,999 800	3.13	0,999 990 42	3.63	0,999 999 716
2.14	0,997 525	2.64	0,999 811	3.14	0,999 991 03	3.64	0,999 999 736
2.15	0,997 639	2.65	0,999 822	3.15	0,999 991 60	3.65	0,999 999 756
2.16	0,997 747	2.66	0,999 831	3.16	0,999 992 14	3.66	0,999 999 773
2.17	0,997 851	2.67	0,999 841	3.17	0,999 992 64	3.67	0,999 999 790
2.18	0,997 951	2.68	0,999 849	3.18	0,999 993 11	3.68	0,999 999 805
2.19	0,998 046	2.69	0,999 858	3.19	0,999 993 56	3.69	0,999 999 820
2.20	0,998 137	2.70	0,999 866	3.20	0,999 993 97	3.70	0,999 999 833
2.21	0,998 224	2.71	0,999 873	3.21	0,999 994 36	3.71	0,999 999 845
2.22	0,998 308	2.72	0,999 880	3.22	0,999 994 73	3.72	0,999 999 857
2.23	0,998 388	2.73	0,999 887	3.23	0,999 995 07	3.73	0,999 999 867
2.24	0,998 464	2.74	0,999 893	3.24	0,999 995 40	3.74	0,999 999 877
2.25	0,998 537	2.75	0,999 899	3.25	0,999 995 70	3.75	0,999 999 886
2.26	0,998 607	2.76	0,999 905	3.26	0,999 995 98	3.76	0,999 999 895
2.27	0,998 674	2.77	0,999 910	3.27	0,999 996 24	3.77	0,999 999 903
2.28	0,998 738	2.78	0,999 916	3.28	0,999 996 49	3.78	0,999 999 910
2.29	0,998 799	2.79	0,999 920	3.29	0,999 996 72	3.79	0,999 999 917
2.30	0,998 857	2.80	0,999 925	3.30	0,999 996 94	3.80	0,999 999 923
2.31	0,998 912	2.81	0,999 929	3.31	0,999 997 15	3.81	0,999 999 929
2.32	0,998 966	2.82	0,999 933	3.32	0,999 997 34	3.82	0,999 999 934
2.33	0,999 016	2.83	0,999 937	3.33	0,999 997 51	3.83	0,999 999 939
2.34	0,999 065	2.84	0,999 941	3.34	0,999 997 68	3.84	0,999 999 944
2.35	0,999 111	2.85	0,999 944	3.35	0,999 997 838	3.85	0,999 999 948
2.36	0,999 155	2.86	0,999 948	3.36	0,999 997 983	3.86	0,999 999 952
2.37	0,999 197	2.87	0,999 951	3.37	0,999 998 120	3.87	0,999 999 956
2.38	0,999 237	2.88	0,999 954	3.38	0,999 998 247	3.88	0,999 999 959
2.39	0,999 275	2.89	0,999 956	3.39	0,999 998 367	3.89	0,999 999 962
2.40	0,999 311	2.90	0,999 959	3.40	0,999 998 478	3.90	0,999 999 965
2.41	0,999 346	2.91	0,999 961	3.41	0,999 998 582	3.91	0,999 999 968
2.42	0,999 379	2.92	0,999 964	3.42	0,999 998 679	3.92	0,999 999 970
2.43	0,999 411	2.93	0,999 966	3.43	0,999 998 770	3.93	0,000 999 973
2.44	0,999 441	2.94	0,999 968	3.44	0,999 998 855	3.94	0,999 999 975
2.45	0,999 469	2.95	0,999 970	3.45	0,999 998 934	3.95	0,999 999 977
2.46	0,999 497	2.96	0,999 972	3.46	0,999 999 008	3.96	0,999 999 979
2.47	0,999 523	2.97	0,999 973	3.47	0,999 999 077	3.97	0,999 999 980
2.48	0,999 547	2.98	0,999 975	3.48	0,999 999 141	3.98	0,999 999 982
2.49	0,999 571	2.99	0,999 976	3.49	0,999 999 201	3.99	0,999 999 983

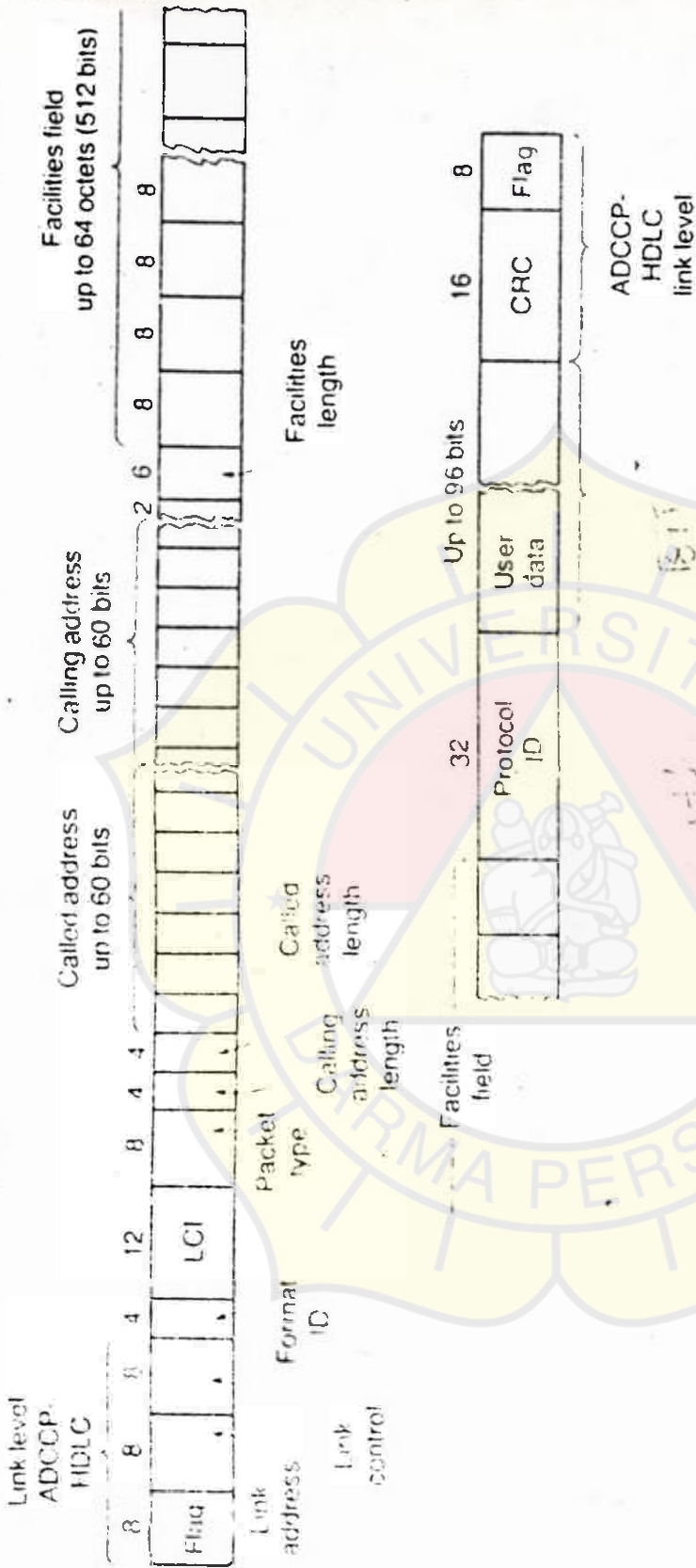
Catatan: Tabel ini diambil dari *The Theory and Practice of Microelectronics*. Oleh Sorob K. Gandhi, John Wiley and Sons, Inc. (1968).

Tabel D=1. Tabel Besaran Fisis.

Besaran fisis	Simbul	Harga Numerik	Satuan SI
Kecepatan sinar	c	2,9979250	10^8 m.s^{-1}
Besar muatan elektron	e	1,6021917	10^{-19} C
Konstanta Planck	h	6,626196	10^{-34} J.s
		4,135708	10^{-15} e.V.s
	$h - h/2\pi$	1,0545919	10^{-34} J.s
Bilangan Avogadro	N	6,022169	$10^{24} \text{ k mol}^{-1}$
Masa elektron bebas	m_0	9,109558	10^{-31} kg
Konstanta Boltzman	k	1,380622	$10^{-23} \text{ J.K}^{-1}$
		8,617083	$10^{-5} \text{ e.V.K}^{-1}$

Tabel E=1. Satuan Fundamental.

Besaran	Satuan	Simbul satuan	Definisi
Panjang	meter	m	Satu meter adalah 1.650.763,73 kali panjang gelombang krypton 85 dalam vakum sama dengan transisi antara dua tingkat energi $2p_{10}$ dan $5d_5$
Masa	Kilogram	kg	Satu kilogram adalah satuan masa (bukan berat ataupun gaya) dan sama dengan kilogram
Waktu	Detik	s	Satu detik adalah lama waktu dari 9992.631.770 kali sebuah periode radiasi yang dihasilkan oleh transisi antara dua tingkat yang super halus dalam keadaan dasar dari atom cesium 133
Arus listrik	amper	A	Satu amper adalah arus listrik yang mengalir dalam dua konduktor yang linier tidak berhingga dengan bagian cincin yang sangat kecil yang paralel dalam vakum yang menginduksi $2 \cdot 10^{-7}$ newton kepada konduktor panjang satu meter.
Temperatur termodinamika	kelvin	K	Satu kelvin adalah satuan temperatur termodinamika dan sama dengan $1/273,16$ dari titik tripel air.
Kwantitas bahan	mol	mol	<ol style="list-style-type: none"> Satu mol adalah kwantitas bahan dari sistem yang mempunyai sejumlah bahan sama dengan jumlah atom yang ada dalam 0,012 kilogram carbon 12. Bila digunakan satuan mol, mungkin bahan harus dinyatakan dalam atom, molekul, elektron atau partikel lain, atau susunan bahan tertentu dari partikel-partikel itu.
Intensitas cahaya	candela	cd	Satu candela adalah intensitas cahaya $(1/680.000)$ dari satu meter persegi benda hitam dalam arah tegak lurus pada ini, pada tekanan 101325 pascal, dan pada temperatur pada titik.



Flag 01111110

Format ID - 4 bits: designates packet characteristics such as connection type, numbering scheme, etc.

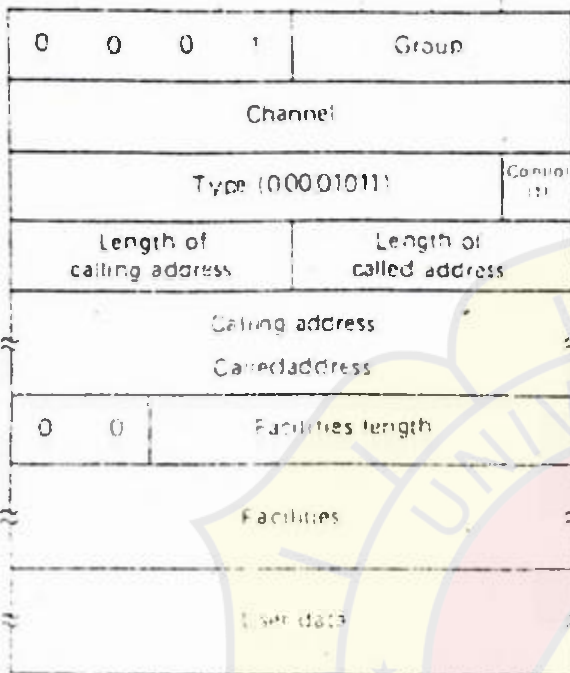
Logical channel no. - 12 bits: 0-4095

Packet type - 8 bits: call request, call clear, data, flow control, signaling, etc.

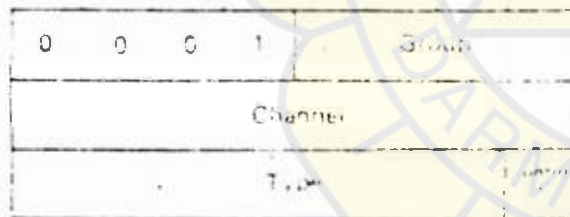
The call-request frame and packet structure as defined by the CCITT X.25 standard.



8 bits

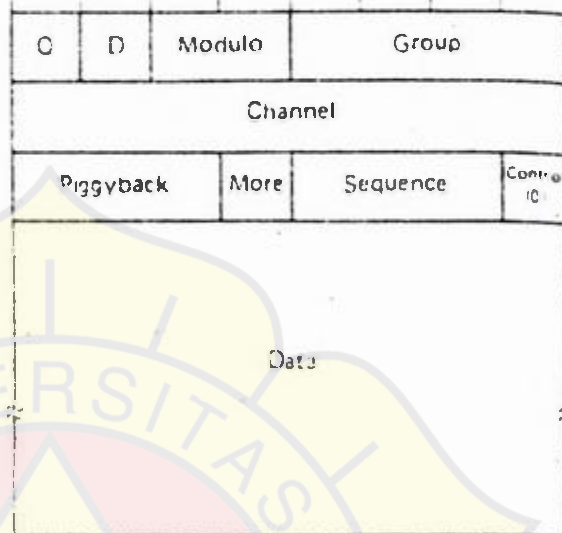


(a)



Additional in to paper

8 bits



(b)

Type	Thru byte
Data	PPPMS5SO
Call request	00001011
Call accepted	00001111
Clear request	00010011
Clear confirmation	00010111
Interrupt	00100011
Interrupt confirmation	00100111
Receive ready	PPP00001
Receive not ready	PPP00101
Reset	PPP01001
Reset request	00011011
Reset confirmation	00011111
Restart request	11110111
Restart confirmation	11110111
Digitally	11110001

(d)

25 packet formats. (a) Call request format. (b) Control packet format. (c) Data packet format. (d) Type field (P = Piggy-Back, S = Sequence, M = More).

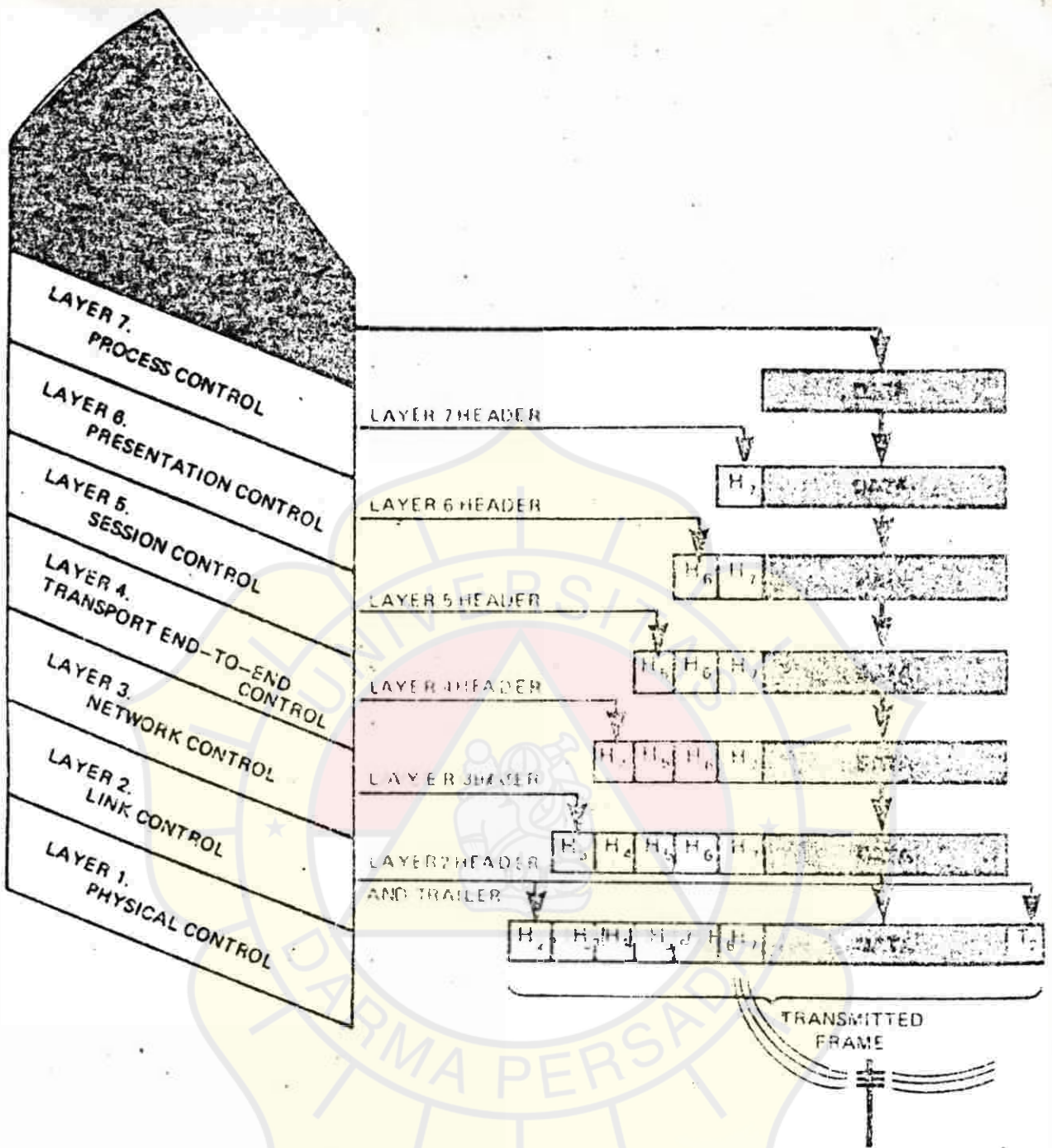


Figure 12.6 Use of headers in the ISO 7-layer architecture.

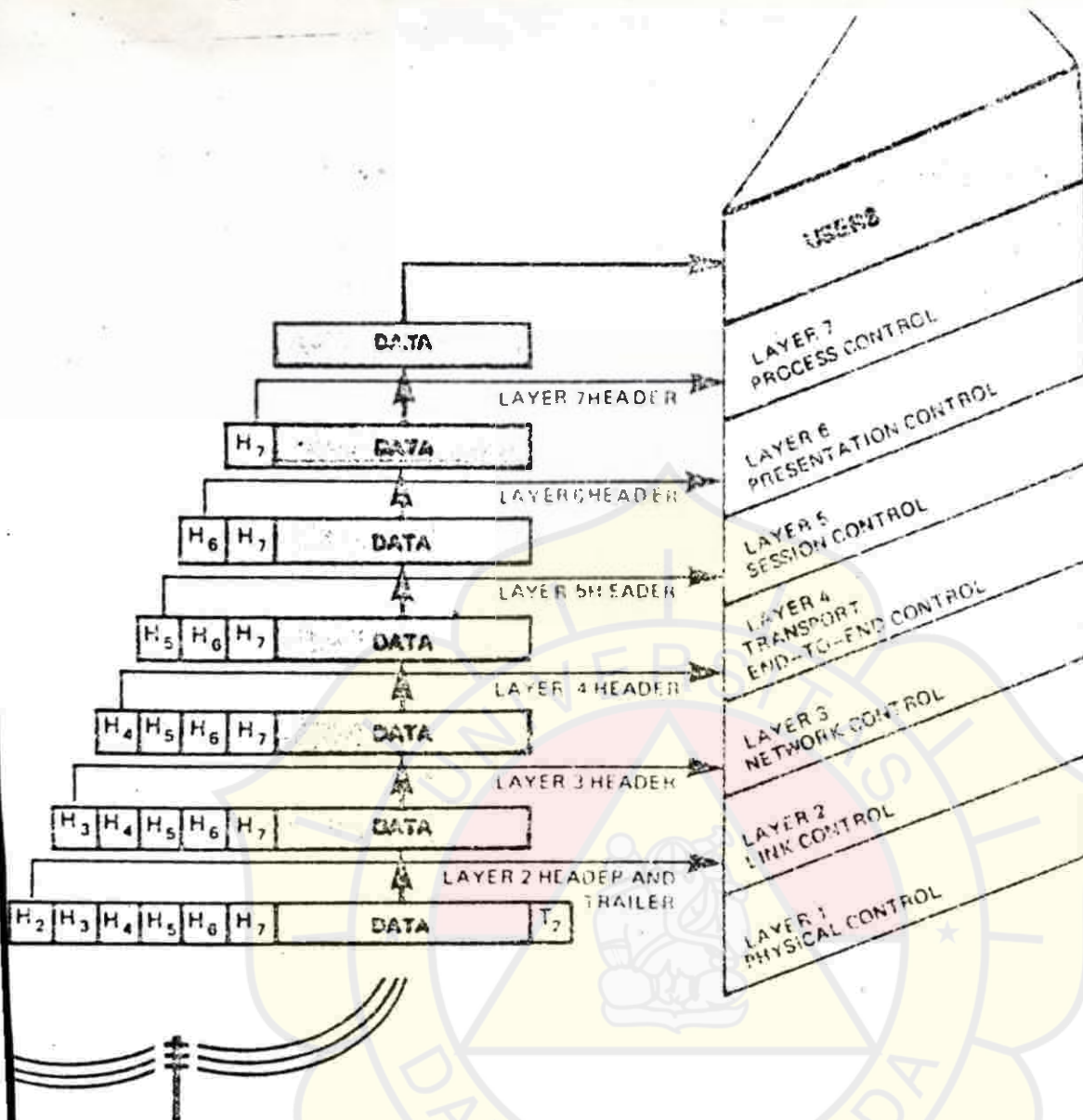


Figure 12.6 Continued.

**BOX 17.1 The X series of CCITT
Recommendations, relating to data
transmission over public data
networks**

<i>Number</i>	<i>Title</i>
X.1	International user classes of service in public data networks.
X.2	International user facilities in public data networks.
X.4	General structure of signals of International Alphabet No. 5 code for data transmission over public data networks.
X.20	Interface between data terminal equipment and data circuit-terminating equipment for start-stop transmission services on public networks.
X.20bis	V-21—compatible interface between data terminal equipment and data circuit-terminating equipment for start-stop transmission services on public data networks.
X.21	General-purpose interface between data terminal equipment and data circuit-terminating equipment for synchronous operation on public data networks.
X.21bis	Use on public data networks of data terminal equipment which are designed for interfacing to synchronous V-series modems.
X.24	List of definitions of interchange circuits between data terminal equipment and data circuit-terminating equipment on public data networks.
X.25	Interface between data terminal equipment and data circuit-terminating equipment for terminals operating in the packet mode on public data networks.
X.26	Electrical characteristics for unbalanced double-current interchange circuits for general use with integrated circuit equipment in the field of data communications.
X.27	Electrical characteristics for balanced double-current interchange circuits for general use with integrated circuit equipment in the field of data communications.
X.30	Standardization of basic model page-printing machine in accordance with International Alphabet No. 5.
X.31	Characteristics, from the transmission point of view, of the interchange point between data-terminal equipment and data circuit-terminating equipment when 200-baud start-stop data-terminal equipment in accordance with International Alphabet No. 5 is used.
X.32	Answer-back units for 200-baud start-stop machines in accordance with International Alphabet No. 5.
X.33	Standardization of an international test for the measurement of the margin of start-stop machines in accordance with International Alphabet No. 5.
X.40	Standardization of frequency-shift-modulated transmission systems for the provision of telegraph and data channels by frequency division of a primary group.
X.50	Fundamental parameters of a multiplexing scheme for the international interface between synchronous data networks.
X.51	Fundamental parameters of a multiplexing scheme for the international interface between synchronous data networks using 10 bit envelope structure.
X.60	Common channel signaling for synchronous data applications—data user part.
X.70	Terminal and transit control signaling system for start-stop services on international circuits between asynchronous data networks.
X.71	Decentralized terminal and transit control signaling system on international circuits between synchronous data networks.
X.92	Hypothetical reference connections for public synchronous data networks.
X.95	Network parameters in public data networks.
X.96	Call progress signals in public data networks.

**BOX 17.2 The V series of CCITT
Recommendations, relating to data
transmission over analog networks**

- V.1 Equivalence between binary notation symbols and the significant conditions of a two-condition code.
- V.2 Power levels for data transmission over telephone lines.
- V.3 International Alphabet No. 5 for transmission of data and messages.
- V.4 General structure of signals of the 7-unit code for data and message transmission.
- V.10 Use of the telex network for data transmission at the modulation rate of 50 bauds.
- V.11 Automatic calling and/or answering on the telex network.
- V.13 Answer-back unit simulators.
- V.15 Use of acoustic couplers for data transmission.
- V.21 200-baud modem standardized for use in the general switched telephone network.
- V.22 Standardization of modulation rates and data-signaling rates for synchronous data transmission in the general switched telephone network.
- V.22B Standardization of modulation rates and data signaling rates on leased telephone circuits.
- V.23 600/1200-baud modem standardized for use in the general switched telephone networks.
- V.24 Functions and electrical characteristics of circuits at the interface between data terminal equipment and data communication equipment.
- V.25 Automatic calling and/or answering on the general switched telephone network.
- V.26 2400 bits/second modem for use on four-wire leased point-to-point circuits.
- V.26B 2400 bits/second modem for use on the general switched telephone network.
- V.27 Modem for data signalling rates up to 4800 bits/second over leased circuits.
- V.28 Electrical characteristics for interface circuits.
- V.30 Parallel data transmission system for universal use on the general switched telephone network.
- V.31 Electrical characteristics for contact closure-type interface circuits.
- V.35 Transmission of 48 kilobits/second data using 60 to 108 kHz group bank circuits.
- V.40 Error indication with electromechanical equipment.
- V.41 Code-independent error control system.
- V.50 Standard limits for transmission quality of data transmission.
- V.51 Organization of the maintenance of international telephone-type circuits used for data transmission.
- V.52 Characteristics of distortion and error rate measuring apparatus for data transmission.
- V.53 Limits for the maintenance of telephone-type circuits used for data transmission.
- V.56 Comprehensive tests for modems that use their own interface circuits.
- V.57 Comprehensive test set for high transmission rates.

Recommendations, relating to data transmission over analog networks

- V.1 Equivalence between binary notation symbols and the significant conditions of a two-condition code.
- V.2 Power levels for data transmission over telephone lines.
- V.3 International Alphabet No. 5 for transmission of data and messages.
- V.4 General structure of signals of the 7-unit code for data and message transmission.
- V.10 Use of the telex network for data transmission at the modulation rate of 50 bauds.
- V.11 Automatic calling and/or answering on the telex network.
- V.13 Answer-back unit simulators.
- V.15 Use of acoustic couplers for data transmission.
- V.21 200-baud modem standardized for use in the general switched telephone network.
- V.22 Standardization of modulation rates and data-signaling rates for synchronous data transmission in the general switched telephone network.
- V.22B Standardization of modulation rates and data signaling rates on leased telephone circuits.
- V.23 600/1200-baud modem standardized for use in the general switched telephone networks.
- V.24 Functions and electrical characteristics of circuits at the interface between data terminal equipment and data communication equipment.
- V.25 Automatic calling and/or answering on the general switched telephone network.
- V.25 2400 bits/second modem for use on four-wire leased point-to-point circuits.
- V.26 2400 bits/second modem for use on the general switched telephone network.
- V.27 Modem for data signaling rates up to 4800 bits/second over leased circuits.
- V.28 Electrical characteristics for interface circuits.
- V.30 Parallel data transmission system for universal use on the general switched telephone network.
- V.31 Electrical characteristics for contact closure type interface circuits.
- V.35 Transmission of 48 kilobits/second data using 60 to 108 MHz group bank circuits.
- V.40 Error reduction with electromechanical equipment.
- V.41 Code-independent error control system.
- V.50 Standard limits for transmission quality of data transmission.
- V.51 Organization of the maintenance of international telephone-type circuits used for data transmission.
- V.52 Characteristics of distortion and error rate measuring apparatus for data transmission.
- V.53 Limits for the maintenance of telephone-type circuits used for data transmission.
- V.56 Comprehensive test set for modems that use their own interface circuits.
- V.57 Comprehensive test set for high transmission rates.