Q325

Rapports de Recherche

N° 31

OVERALLOCATION IN A VIRTUAL CIRCUIT COMPUTER NETWORK

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Septembre 1980

BIBLIOTHEQUE DU CERIST

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Résumé: Dans cet article, nous étudions l'effet du contrôle de bout en bout induit par le protocole X25 et l'utilisation de canaux virtuels. Nous développons un modèle mathématique pour obtenir la surallocation optimale des tampons des noeuds de commutation, tout en maintenant la probabilité de débordement inférieure à une valeur donnée.

Abstract: In this paper, we study the end-to-end control through virtual circuits in a computer network built following the X.25 Recommendations. We develop a mathematical model to obtain the maximum overallocation of node buffers, in order for the probability of overflow not to exceed a given value.

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1. Introduction

CCITT Recommendations X.25 [1] has been selected by some telecommunication organizations as one of their packet switching network user interfaces, e.g., Datapac (Canada), DDX (Japan), Telenet (USA), Transpac (France), KDD (Japan). However due to implementer's individual interpretations and additions, the X.25 recommendations are somewhat moving. The main differences have been listed in [2].

First we discuss the main characteristics of X.25 Recommendations and then we detail a possible interpretation. In this context, we develop a mathematical model to study a method that allows a number of users (sharing the resource of a node) greater than the theoretical number.

2. The X.25 Recommendations [3].

X.25 specifies the protocols or rules for exchanging information between similar levels in the Data Terminal Equipment (DTE) and Data Circuit - terminating Equipment (DCE) as shown in Figure 1.

These levels have been identified in the X.25 Recommendations. Each level accepts information from a higher level and adds a header and possibly a trailer before passing the information across the interface presented by the next lower level.

- level 1 - Physical interface. This specifies the electrical and physical characteristics of the interface to the leased or switched line into the network and how to establish and control these connections.
- level 2 - Link access procedure (LAP). This specifies a datalink control procedure for converting the error-prone physical circuit into a relatively error-free link. It is based on the high level data link control (HDLC) defined by the International Standards Organization (ISO).
- level 3 - packet level. This is the highest level. It specifies how information is structured into packets. Level 3 provides the facilities for establishing virtual circuits which are bidirectional associations between a pair of DTEs over which packets are exchanged.

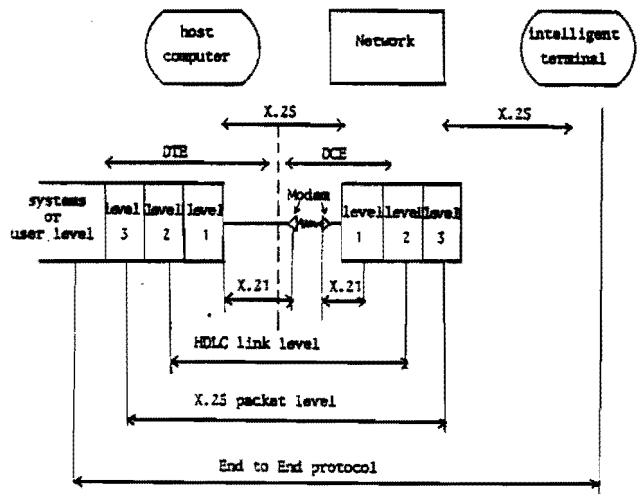

Figure 1 : The X.25 protocol

In this paper we are interested mainly in the level 3 and particularly in the use of virtual circuits.

The packet level of X.25 performs an asynchronous time division multiplexing function to transform the single logical channel provided by level 2 into a number of logical channels. The logical channels are used to provide bidirectional associations between two end DTEs as shown in Figure 2.