

Master 2008

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Definition and Implementation of a Channel Coding Algorithm for a High Data Rate Satellite Link

ABSTRACT - Masterthesis

The amount of data transferred across communication networks throughout the world is increasing at a high rate. This calls in for very high speed data switching and/or packet networks and lines. With the development of more and more ad-vanced and complex networks and data communication systems the flow of data has increased to an overwhelming amount.

Accidents, whether caused by human errors or natural calamities usually cause the breakdown of such systems and networks. This can cause disruption of communication in loss of billions. For that reason backup systems keep the data flow up and running to a certain level.

Satellite communication has been very helpful in this field and is also used in other data communication systems. But again, as mentioned the current rate of transfer across the world has increased to a very huge amount and due to limited bandwidth available for satellite communication, this transfer rate available from a satellite could be very small.

Satellites have been used for many purposes other than just providing backup for communication or data networks, but as service nodes for satellite phones communications, television broadcast systems, space and earth observation, earth atmosphere measurements and so on. The advancements in all these different fields have resulted in the increase of data due to more complex systems and algorithms. These factors and others like limited time frame push the limits of communication circuits and codes on the satellite systems. To fulfill these requirements the Institute of Aerospace Technology undertook a project, developing a novel downlink system called DATARAIN with data rates nearing 1 Gbit/s.

This master thesis aims at providing and discussing hardware implementation of an iterative channel codec capable of low error rates. The outcome of this master thesis would give the hardware programmer an overview about the complications of the codec, in what ways it could be made to work fast, what could slow down the decoding process, what the performance against speed costs would be and what possible implementation techniques could be used to achieve certain performance or speed levels.