

High Reliability and Large Capacity Next Generation Mobile Communication Networking

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Abstract: Next generation mobile communication networks appeal to data and multimedia communications, and require high efficiency and reliability. Multiple transmitting and multiple receiving BLAST system, advanced by Bell Laboratory, is combined with LAS-CDMA, a novel multiple access scheme. This compound system will realize large capacity and high reliability transmission and become an ideal resolvent for future mobile communication systems.

Keywords: BLAST, LAS-CDMA, detection, reliability, capacity.

1 INTRODUCTION

Next generation mobile communications, known as fourth generation or beyond three generation, mostly bear data and multimedia services. According to year 2010 layout of ITU, outdoor mobile communication data rate needs to attain 20Mbps, while indoors to 100Mbps, so as to entirely meet the requirement of next generation networks^[1]. In most cases, wireless communication channels, due to space media multi-path effect^[2], will induce intersymbol interference (ISI), co-channel interference, adjacent channel interference, and adjacent cell interference (ACI). With the influence of all these interferences, signals will result in severely fading through the channel, which greatly affects the system performance. High reliability and large capacity of next generation mobile communication networks has become research focus.

Bell Laboratories Layered Space-Time architecture, now known as D-BLAST^[3] or V-BLAST^[4], utilizes multi-element antenna arrays at both transmitter and receiver and expands parallel transmission channels. This structure leads to theoretical rates, which is proportional to the number of antennas, approaching 90% of Shannon capacity^[4]. BLAST has undoubtedly become one of optional schemes in the next generation mobile networks. At present, CDMA cellular communication can distribute a group of spread spectrum access codes to a user so as to improve transmitting rates, which is similar to parallel transportation of BLAST system. So BLAST is naturally combined with multi-code CDMA, named BLAST-CDMA^[5], to achieve high speed communication transmission. But traditional BLAST-CDMA architecture is mainly affected by inter-antenna interferences, due to a path interval far less than modulated symbol duration in multi-path fading channel, and by multiple access interference for unperfect orthogonality of access codes. Then reliability and capacity

