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## 广域网加速在FY 3气象卫星数据传输中的应用

Application of the WAN Acceleration Technologies to FY 3 Satellite Data Transmission

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### 摘要:

风云三号(FY 3)极轨气象卫星数据传输系统需通过广域网链路,将海量卫星观测数据从卫星接收站快速传送到资料处理中心。该文研究广域网加速技术,解决广域网链路中传输气象卫星海量观测数据延迟高、带宽利用低等难题。文中针对FY 3气象卫星观测数据传输量大、时效要求高的特点,分别分析了数据压缩、数据缓存和协议优化3种不同加速技术对卫星数据的传输优化效果,并根据分析结果提出了一种适用于气象卫星数据的广域网传输加速架构。该架构结合3种不同加速技术设计了TCP代理模块、数据段索引模块和HS TCP传输模块以及相应算法分别实现了数据压缩与缓存和协议优化等功能。通过测试和实际运行表明:在该加速架构下卫星数据广域网传输速率提高了50%~243%。

关键词: [广域网加速](#) [极轨气象卫星](#) [海量气象卫星数据](#) [广域网传输](#) [加速架构](#)

### Abstract:

FY 3 series is a new generation of polar orbiting meteorological satellite which is much more powerful than FY 1 series. As the first research and development satellite of FY 3 series, FY 3A meteorological satellite carries 11 kinds of instruments with more than 90 observation and probing channels, and it has the capabilities of global sounding, global imaging of the earth's surfaces and natural color imagery with a higher spatial resolution of 250 m. The size of the raw data files for one pass of FY 3 meteorological satellite is almost 100 times as FY 1. There are 4 domestic ground stations set up in China, and they are located in Beijing, Guangzhou, Urumqi and Jiamusi respectively. These 4 ground stations are responsible for receiving the FY 3 satellite observation data and transferring them to the data processing center which is located inside the building of National Satellite Meteorological Center in Beijing. It is really a big challenge for the data transmission system of the FY 3 satellite to transfer the massive meteorological satellite observation data efficiently and timely from the ground stations to the data processing center. The WAN acceleration technique is studied to solve the problems such as high delay in transmission of massive satellite observation data and little bandwidth utilization during WAN link. To deal with the data transfer characteristics of FY 3 properly, massive observation data and high timeliness requirement for instance, the transmission optimization effects of three different acceleration techniques, including data compression, cache and TCP protocol optimization on meteorological satellite data are analyzed respectively. According to the analysis results, a WAN data transmission acceleration architecture which is suitable to FY 3 satellite observation data transmission is illustrated and presented to break the bottleneck of data transmission through WAN. This architecture combines TCP proxy module, segment index module and HS TCP transfer module by integrating three different acceleration techniques to realize the key functions such as data compression, cache and protocol optimization. Experimental and operational practices show that this WAN data transmission acceleration architecture results in impressive acceleration, and FY 3 satellite data transmission rate through the WAN is accelerated up to 50%—243%.

Keywords: [WAN acceleration technology](#) [polar orbit satellite](#) [magnanimity meteorological satellite data](#) [data transmission in WAN](#) [acceleration architecture](#)

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