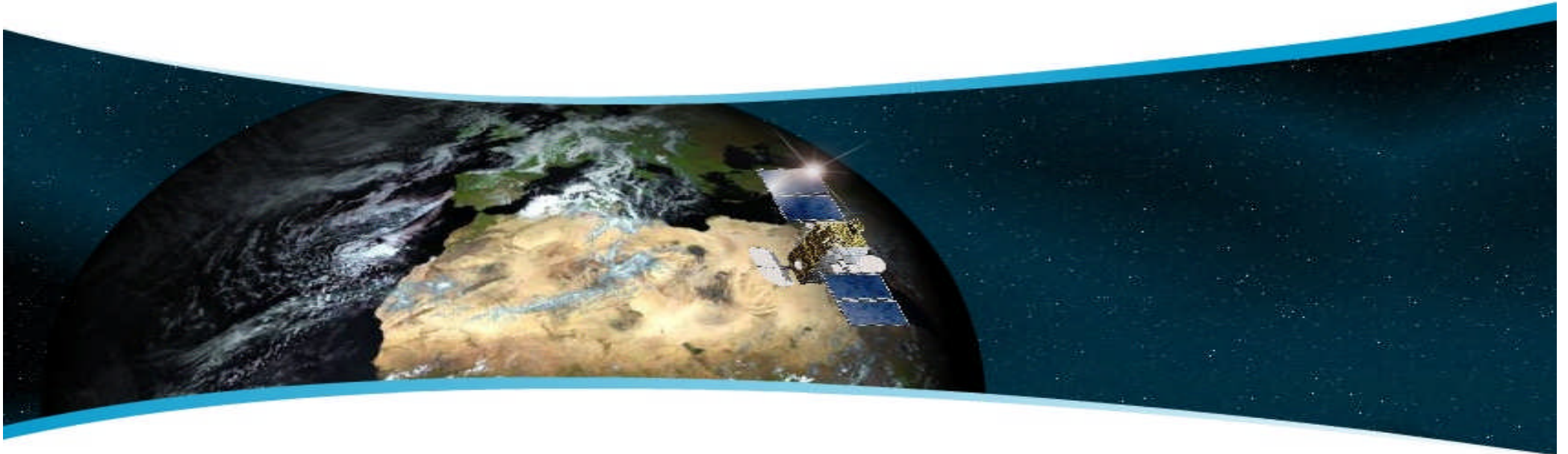


Router EXtension for enhanced broadband performance



Avanti Communications Group plc

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- **Avanti provides broadband via satellite**
- **First broadband satellite (HYLAS 1) Launch 2010**
- **We are the European #1 specialist in Satellite Broadband**
- **16% of UK homes can't receive 2Mbps broadband**
- **Satellite addressable market of over 1.9 million homes (*Ofcom*)**



Motivation

- **Satellite, mobile, and fixed networks all have different characteristics**
- **Internet protocols are optimised for fixed networks**
- **Satellite broadband uses a number of clever techniques to improve users performance (e.g. TCP/IP Acceleration)**
- **But often they rely on bespoke solutions developed by hardware vendors**
- **This makes new techniques difficult to introduce without collaboration with manufacturers**
- **Our motivation is to be able to introduce new techniques that we could implement ourselves using open source hardware and software**

Objectives and What We Did

- **What acceleration techniques could be used to improve the quality of experience?**
 - **Identify and select candidate techniques to test**
 - **What are the requirements?**
- **What are the practical steps involved in implementing these techniques?**
 - **Select an open source router**
 - **Select an open source firmware**
 - **Configured the router with correct firmware**
- **Could this approach be deployed in the field?**
 - **Debug certain conflicting firmware**
 - **Maintenance**

Router and Firmware Selection

- **Linksys WR610NG**
- **USB port**
- **From £50**



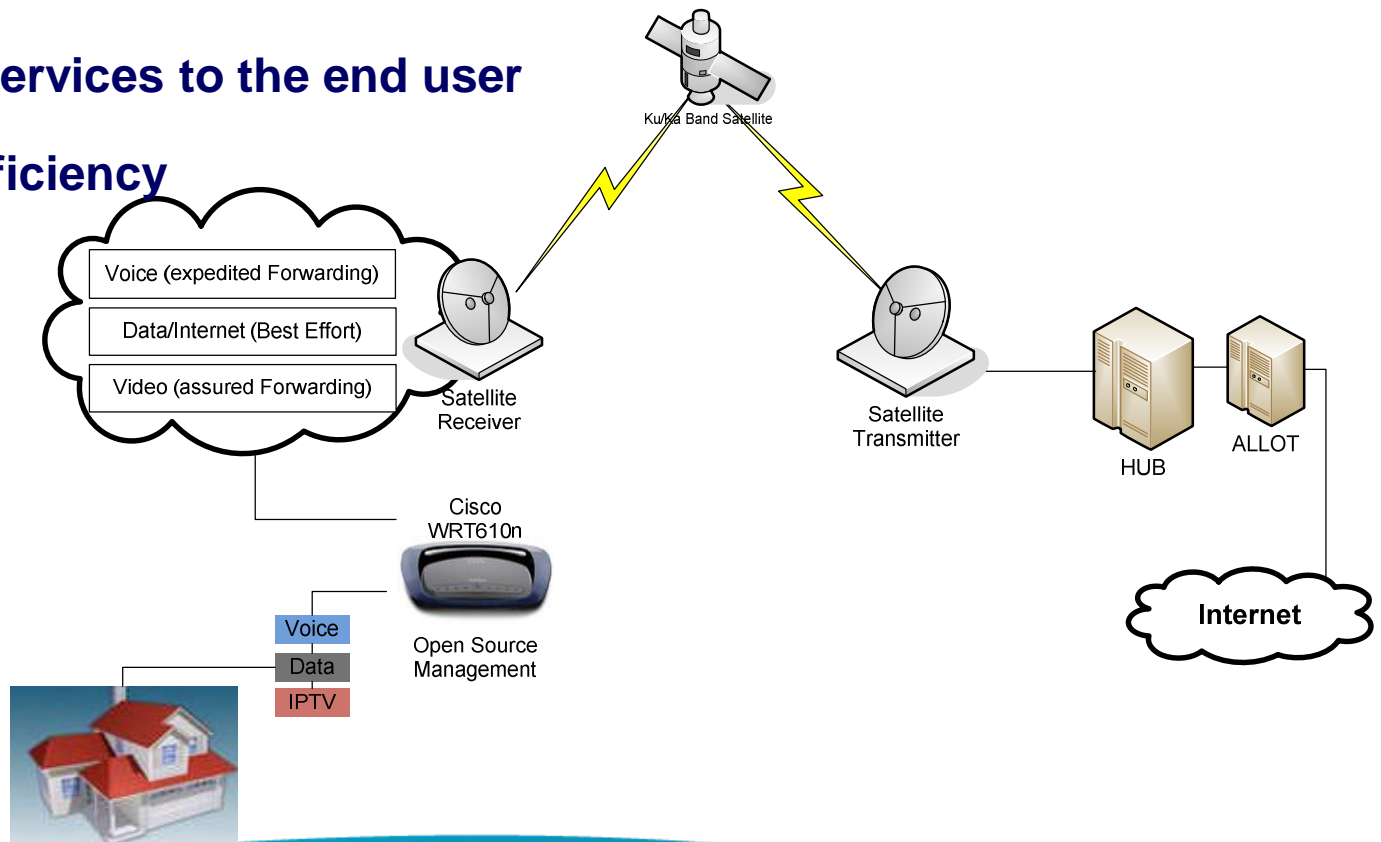
CPU Speed	RAM	Flash Memory	Operating System
533 MHz	64 Mb	8Mb	Linux Based



- **DD-WRT is a Linux - based firmware**
- **Third-party firmware solution**
- **Offers routers enhancement**

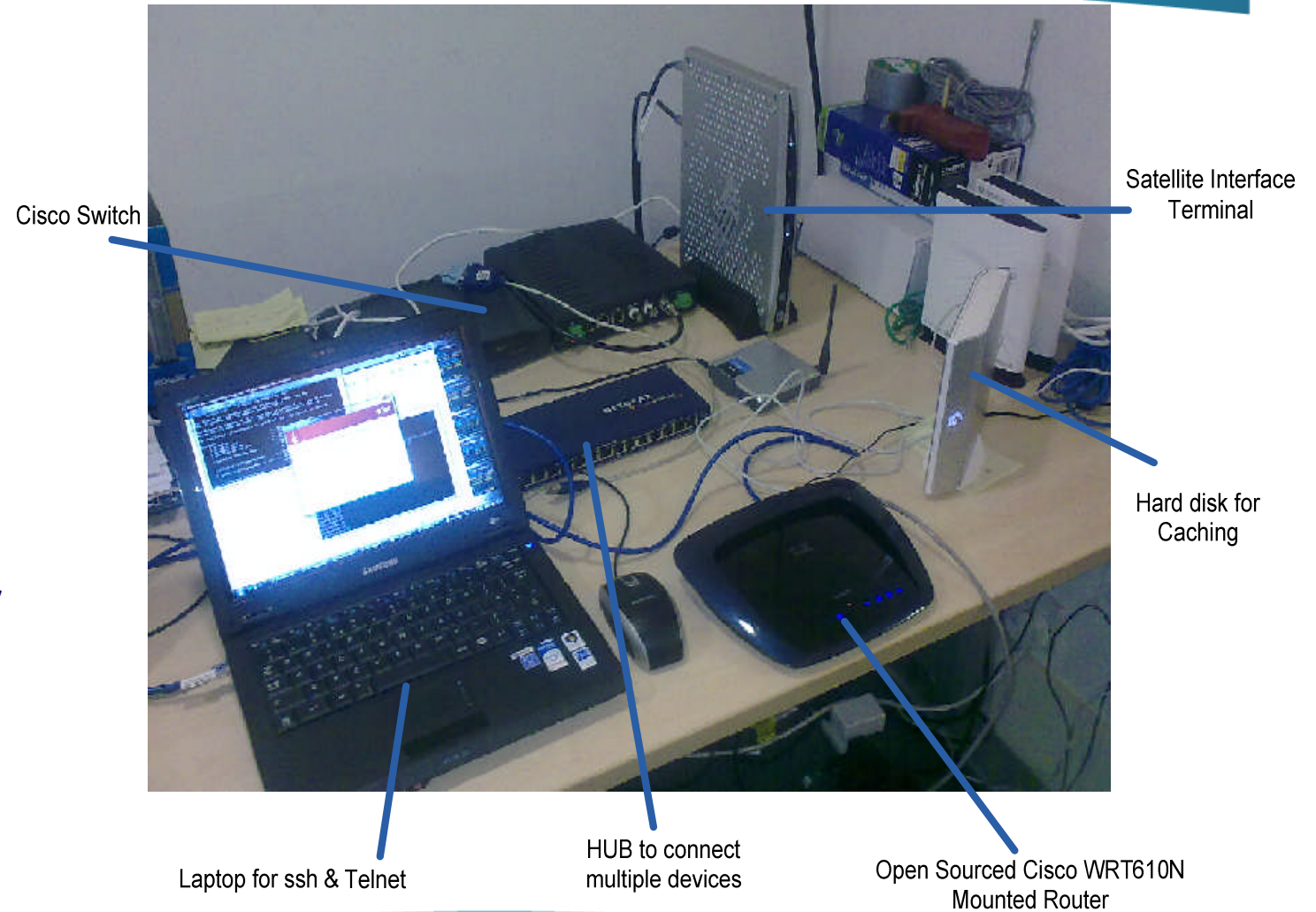


- Reduce the effect of latency felt by the end user locally
- Better quality of experience to the end user
- Provide value added services to the end user
- Improve bandwidth efficiency



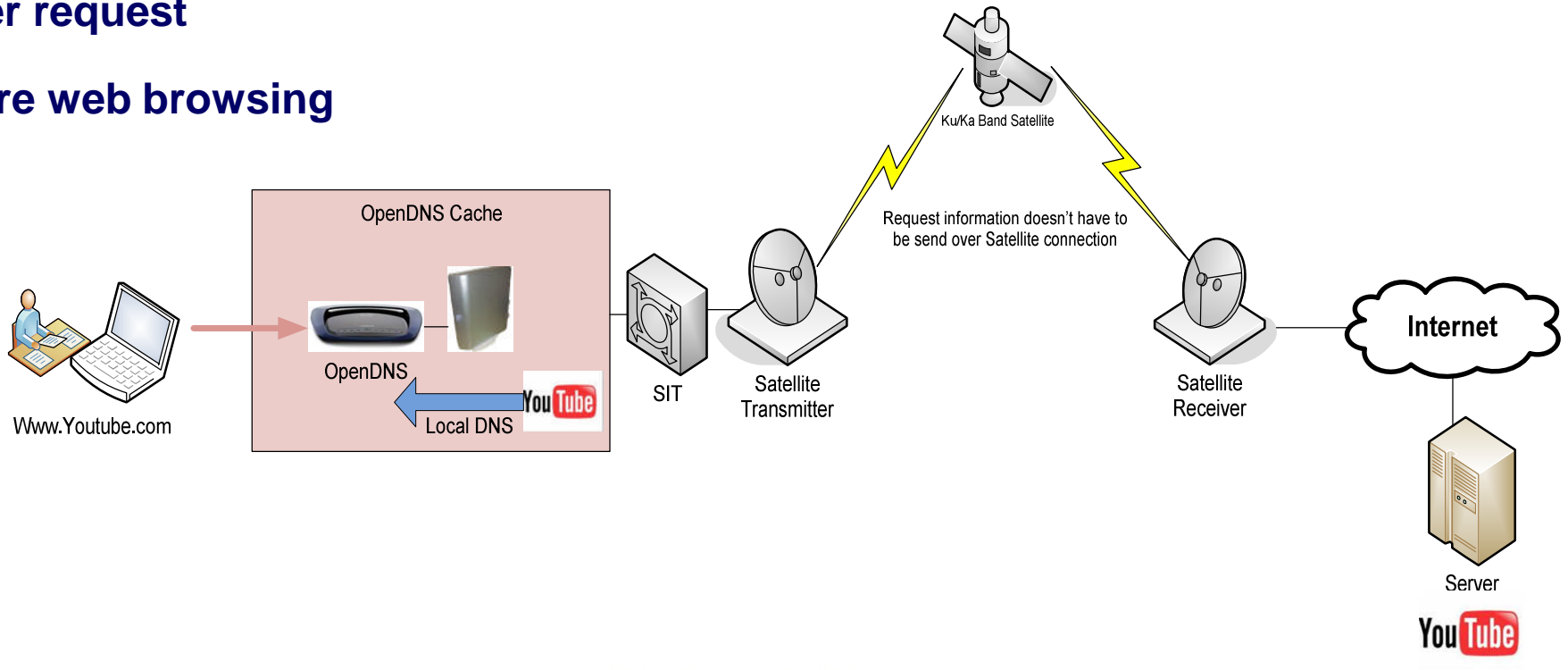
REX Test-bed

- **Avanti Test bed**
 - **Satellite terminal**
 - **Cisco router**
 - **Hard disk**
- **Proof of concept**
 - **Open DNS server**
 - **Caching**
 - **Acceleration**



Benefits

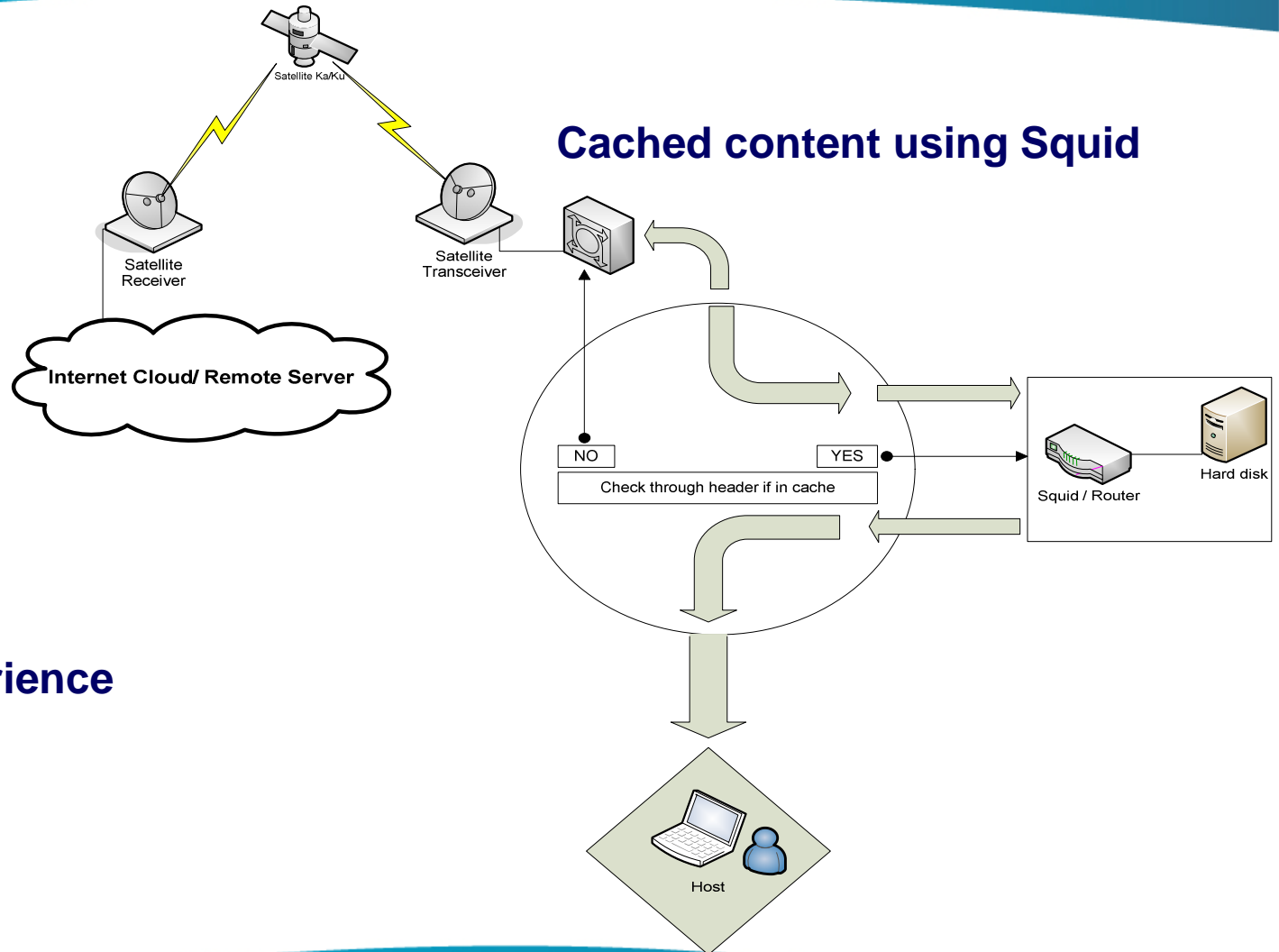
- Faster request
- Secure web browsing



Caching Technique

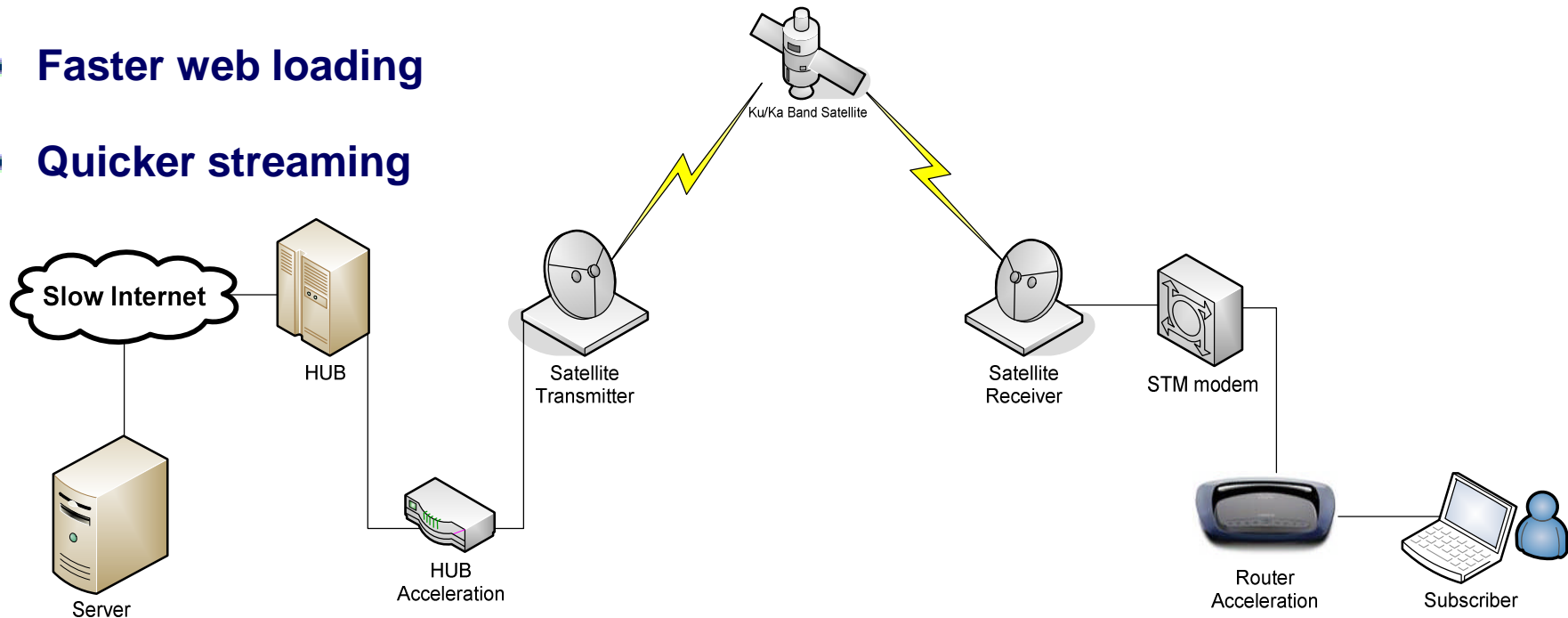
Benefits

- Efficient bandwidth
- Faster streaming
- Improved user experience



Benefits

- Integrated design
- Faster web loading
- Quicker streaming



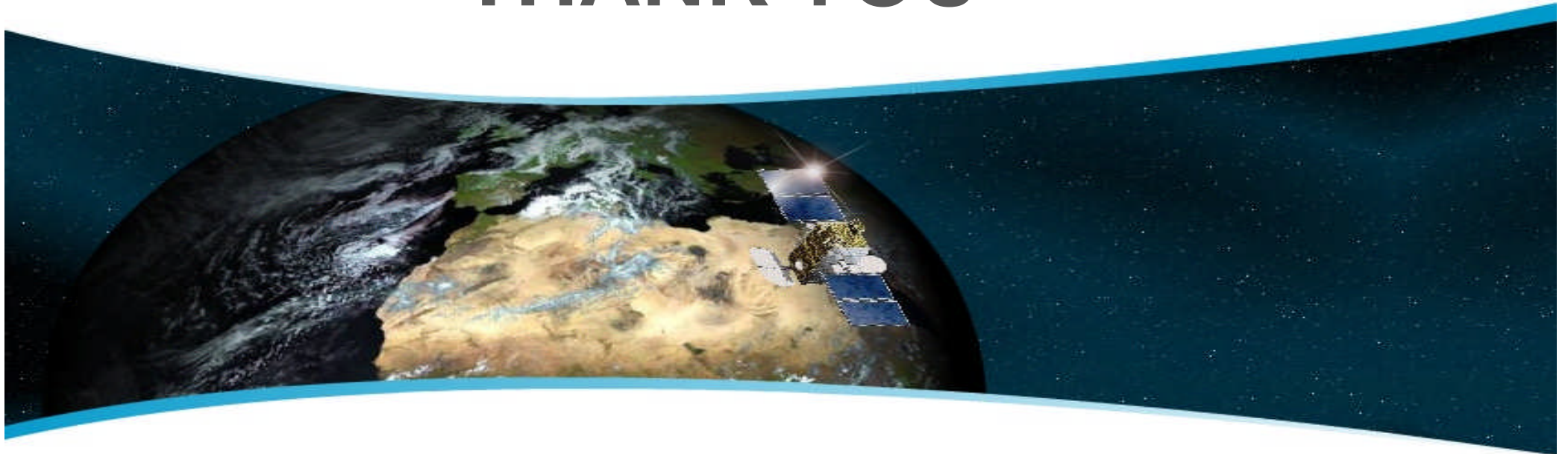
Lessons Learned

- **Little research has been done into router enhancements**
- **This open source approach can be tricky and requires careful management**
- **The approach can be used to implement new techniques**
- **Benefits and opportunities**
 - **Reduced satellite backhaul usage**
 - **Quality of experience by subscriber**
 - **Provide network performance monitoring**
 - **Capacity saving**

Next Steps

- **Implement this approach in real world trials**
 - **Trial test-bed with many users**
 - **Open source WAN acceleration**
 - **Open source local video caching**
 - **Measure performance enhancement**
 - **Gather user feedback**

THANK YOU



Questions?