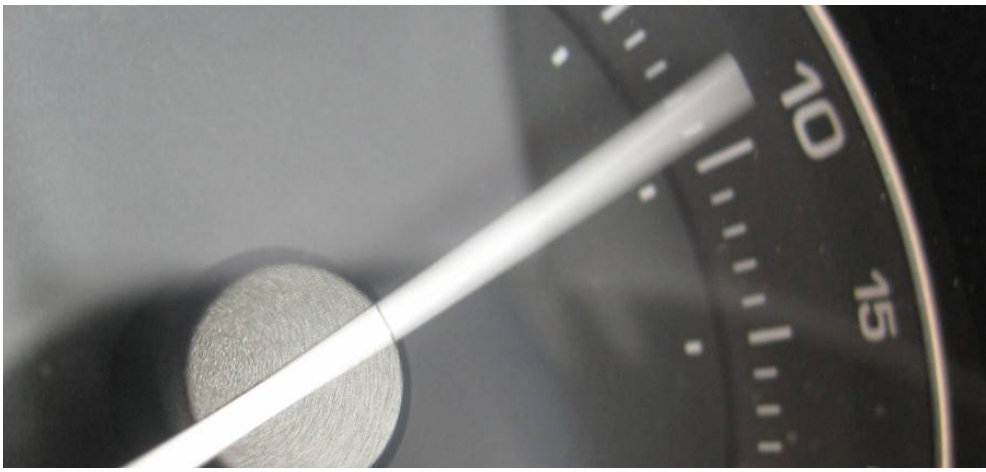

About TIXEL

Solutions • Technology • Background

Standard data transfer tools fail miserably on today's multi-gigabit networks. Thus many companies are still shipping hard disks instead of using existing high-speed network infrastructure. TIXEL's ultimate goal is to help their customers to exploit their cost intensive resources for data greedy distributed workflows and business processes.

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Mission

Along with data intensive global workflows there is a growing demand for fast long haul data transmission.

Standard data transfer tools fail miserably – despite of today's multi-Gigabit networks. Thus many companies are still shipping hard disks instead of using existing high-speed network infrastructure. Hence highly qualified personnel is doomed to wait, time-critical processes are unnecessarily delayed and expensive system and network resources cannot be utilized.

TIXEL's ultimate goal is to help their customers to eliminate inefficient exploitation of cost intensive resources in their data greedy distributed workflows and business processes. Therefor the engineers at TIXEL continuously develop and create innovative solutions based on the high-speed transfer engine, that overcomes the deficiencies of legacy transfer methods.

Solutions and products

TIXEL's solutions and products are applied when massive amounts of data need to be moved between different locations for distributed workflows, e. g. in media industry and science.

They provide a significant acceleration of data transfers – crucial for time critical workflows.

TIXEL provides a wide range of acceleration solutions that address different application scenarios: Flag ship TIXstream enables ultimate source-to-sink transfer speeds. For heavy duty big data transfers TIXway is focused on ease of integration and provides transparent acceleration of existing FTP-based workflows. TIXpipe defines a whole new application category that for the first time allows to feed the output of local application directly over the network into a remote application – no intermediate file handling necessary and of course at unrivaled transfer speeds

For specific applications and OEM solutions with challenging transfer requirements TIXEL offers an SDK and customized solutions.

Technology

Why do legacy network protocols fail in modern business processes?

Two basic protocols are available for data transfer: Transmission Control Protocol (TCP) and User Datagram Protocol (UDP).

TCP is used in many applications for transferring files and other data – like File Transfer Protocol (ftp), Hypertext Transfer Protocol (http) or Simple Mail Transfer Protocol (smtp). Characteristics are

- adaptation of sending rate according to network conditions
- attempts to continuously increase sending data rate
- slow down on timeouts
- TCP (even tweaked) fails on high-latency networks with jitter or packet loss

UDP was designed for low latency real-time audio and video applications e. g. IP telephony. UDP sends data packets while ignoring any transmission errors. Characteristics are:

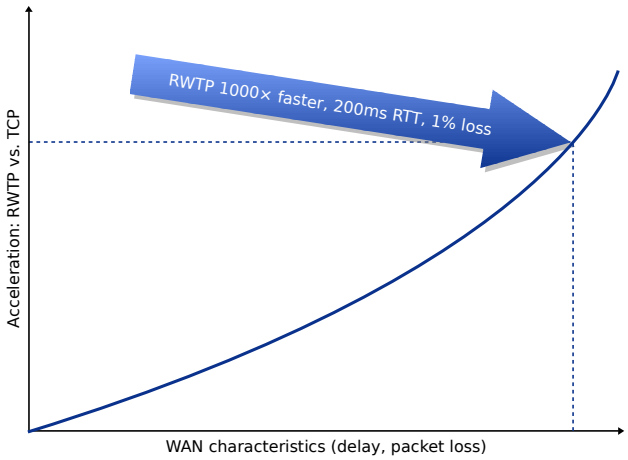
- UDP is connectionless (not reliable)
- even with FEC UDP is not resistant against bursty packet loss

Thus neither TCP nor pure UDP is capable of providing reliable high speed data transfer in wide area networks. Therefor TIXEL designed its own Reliable WAN Transfer Protocol (RWTP) built upon several innovative, patent-pending mechanisms that address the deficiencies of legacy protocols.

Size doesn't matter – speed does

Independent of the size of the data sets (1 Megabytes, 100 Megabytes, 10 Gigabytes or several Terabytes) RWTP accelerates transfers over long distances by factors of up to 1000 and more and ensures maximum transfer speed. In a simulated WAN environment with a 10 Gigabit link (round trip time: 200 ms) and a packet loss rate of 1 % (representing a distance of several thousand kilometers) RWTP outperforms TCP by a factor of 1000.

Hence RWTP dramatically increases the utilization of high speed WAN connections and thus workflow and processing times can be reduced by an order of magnitude. Either transfer times shrink from days to hours or from hours to minutes.



In combination with the TIXstream high performance software framework, that builds the foundation for TIXEL's product line, these data rates are ensured throughout the entire input/output and processing chain.

Why are we faster than others?

Several key aspects have been addressed with new innovative approaches in order to achieve maximum performance on network and data processing level.

Automatic repeat request (ARQ) principle

- Intelligent Acknowledgment (ACK), Negative ACK (NACK), and Selective ACK (SACK) management
- Exploitation of IP-network characteristics
  - Burstiness of loss patterns
  - Proactive management of network events

Advanced flow control

- Intelligent heuristics for buffer management
- Application of second and third derivatives of increase/decrease rates

No data compression or deduplication

- Thus avoiding immanent additional processing delays
- Already encoded/encrypted data can be transferred with full speed

Consequent exploitation of multi-core architectures

- high performance parallel programming
- Advanced locking strategies
- Asynchronous data pipelining

The most important point here is, that an innovative network protocol design by itself cannot solve the overall performance issue – its highly optimized implementation and the integration into a high-performance framework along with efficient I/O and processing routines are essential for achieving maximum end-to-end performance in real world applications.

TIXstream	TIXway	TIXpipe	TIXcustom
TIXstream Framework			
RWTP			

The TIXstream framework covers the entire chain from source to sink and builds the foundation of all TIXEL products.

Benefits

TIXEL offers highest transfer speeds and fastest replication of large amounts of bulk data. This allows significant acceleration of distributed workflows in manifold areas of application. Moreover TIXEL solutions are enabler for novel workflows which have been impossible to implement so far.

- Enables global B2B inter-facility collaboration
- Optimizes usage of limited and expensive resources
- Dramatically decreases workflow process time

Company background

In 2005 the Technology division of media services giant Thomson/Technicolor launched an ambitious research project to tackle one of the most crucial issues of globally distributed movie production and massive network based bulk data transfer: exchange of time critical super large digital media files over long distances and finally eliminating the need to ship physical media aka “sneaker-net”, leaving expensive storage and WAN infrastructure underutilized and having expensive creative staff idling.

So a team of enthusiastic engineers was formed to design and implement innovative approaches to eliminate FedEx planes and UPS trucks from the process of transferring massive media data and finally utilize and monetize the existing high-end network and storage infrastructure. The first demonstrator that was capable of streaming uncompressed 2K high-resolution image sequences with at that time unbeaten data rates of more than 3 Gigabit/s over an emulated 10000 km distance. IT was presented to the public at the world's largest media trade show NAB in 2007. The same year the team showed the world’s first real-time transmission of 4K uncompressed video over a real-world production long distance IP connection at a large press event at Thomson/Technicolor. Half a year later in early 2008 the

first data transfer systems were deployed at Technicolor, Hollywood and accelerated the existing transfer processes by a factor of 10 and finally removed the burden of shipping physical media back and forth between different production facilities.

A year later, in 2009, TIXEL was founded as a spin-off from Thomson with the mission to further develop and adapt the technology for different vertical industries besides media and entertainment and serve a widened range of customers – all having the same objective: speed up data-intensive processes in a collaborative globally distributed environment. Since then TIXEL has continued to invent top notch technology and created additional innovative acceleration products. In 2011 TIXEL showed with one of the first commercial 100 Gigabit/s network and storage setups, how their TIXstream product can be used in a cluster-environment, demonstrating that TIXEL's technology is ready to maximize bandwidth utilization for next generation of high-speed networks.

TIXEL's technology is covered by more than 10 patent families filed in the U.S., Europe, and Asia. It is continuously improved and extended by a highly experienced engineering team. while a growing network of partners ensures that customers all over the world – SMBs and enterprises – can benefit from TIXEL's innovations.