Pacbyte Solutions

Creating innovative software solutions to revolutionise the efficiency and profitability of the connected world.

<netPump™> Presentation

The Market

The challenge is…

Growing internet traffic and devices

- Global internet IP traffic is forecast to grow threefold to reach over 278 Exabytes per month in 2021 up from 96 Exabytes per month in 2016.
- Australia's internet IP Traffic is forecast to grow to 1.9 Exabytes per month by 2020 up from 711 Petabytes per month in 2015.
- By 2021, global IP video traffic will be 82% of all global consumer internet traffic and there will be **2.6 billion connected TVs**.

Increased network congestion

- Network connections are affected by physical impediments, congestion, user environment, distance from exchange etc. Resulting in download speed that is often substantially lower than the (theoretical maximum) line connection speed.
- This is compounded by the rapid growth of connected devices, machine-to-machine (M2M), internet of things (IoT) and autonomic processes – with 15 billion devices sharing, downloading or uploading data projected to **increase to 26 billion devices in 2020**.
- So even with emerging technologies such as fibre optic networks, 5G and HEVC, additional solutions are still needed to ensure infrastructure can meet network demand.

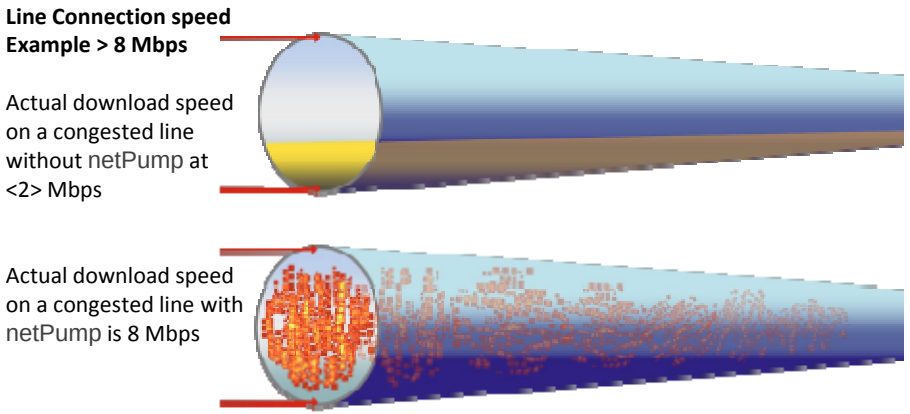
Margin Compression

- Expensive Content Delivery Networks (CDN) provide additional network infrastructure to deliver content are forecast to carry over 71% of all internet traffic by 2018.
- Increased cost of delivery of internet services.

(source: Cisco VNI Forecast)

The Solution <netPump>

- **netPump** software is an innovative video streaming and data transmission method which enables **up to 50% more data per second throughput**, **up to 10x accelerated delivery speed on high latency networks** (including uploading and downloading speeds) over a standard internet connection (TCP) while using over 50% less CPU and I/O batter power.
- This proprietary data transmission method uniquely **combines data acceleration, lossless compression, intelligent caching and network optimisation in one.**
- netPump uses a unique multithreading process for the manipulation of concurrent parallel threads (up to 10) which enables accelerated delivery, automatically accesses latent capacity and optimises performance across multiple levels of a network on existing information technology infrastructure.
- netPump writes to cache memory on a receiving device and intelligently determines the optimal cache memory allocation to maximise efficiency for the rate at which data is received and to minimise network overhead. In addition to this the netPump Video limits processing CPU usage and I/O battery power on the receiving device and maximises performance of the network connection.
- can be used on IT infrastructure with or without the use of content delivery networks (CDN) proxy servers and data centres.
- delivers significant margin improvement, increased business productivity, easy deployment and superior customer outcomes.



Deployment of netPump

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Can be deployed at any level…

Devices

Cloud

Wireless

App

Browser

Infrastructure

Network

CDN

Intranet

Plug-ins

Business Benefits <netPump™>

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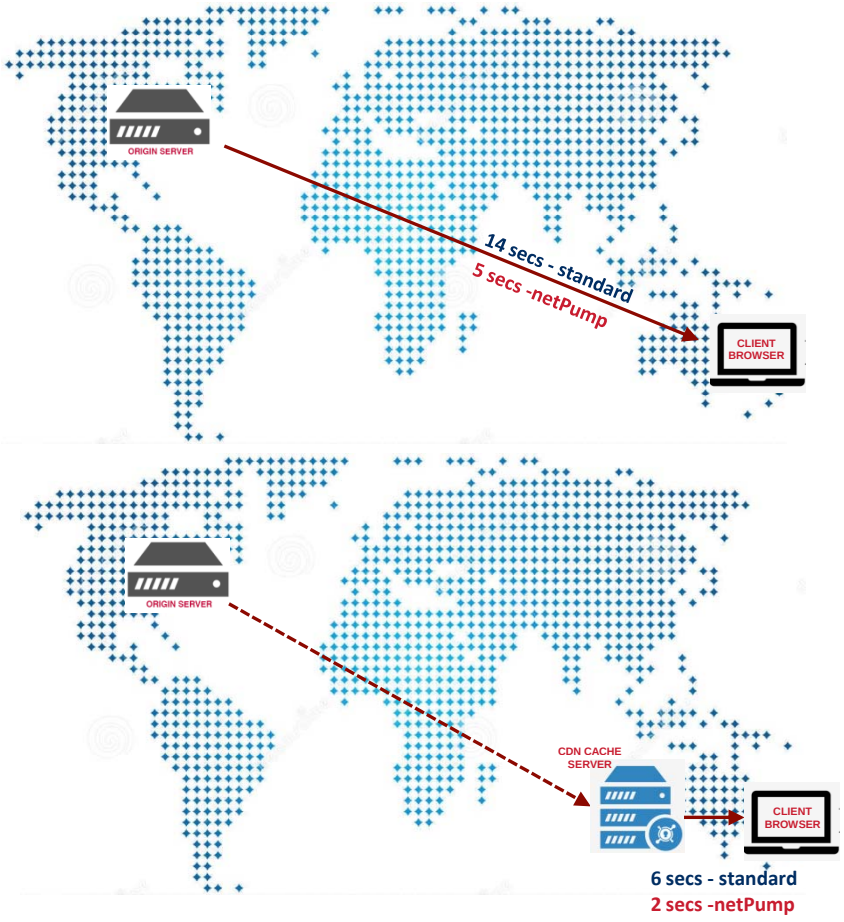
- **Immediately increase profitability** – lower transit and capacity fees, less cost per gigabyte and bandwidth costs resulting in cheaper delivery of data and video streaming with or without using content delivery networks (CDNs).
- **Faster delivery speed** - moves up to 50% more data per second.
- **Agnostic technology** – delivers any binary file using common computer languages incl. metadata & digital rights management files.
- **Unlike other acceleration technologies** – uses standard internet protocol (TCP) not UDP transmission on existing IT infrastructure with or without content delivery networks (CDNs).
- **Superior customer outcomes** – the netPump Video SDK can deliver broadcast quality, consistent and robust video streaming with no buffering and jittering increasing user quality of experience (QoE).
- **Lower cost solution** – netPump doesn't require expensive server infrastructure to run on so can offer a lower cost solution.
- **Minimal business interruption** – quick, easy and low upfront cost implementation with no network downtime and few IT resources.
- **Easy deployment** – uses familiar developer environments for easy, seamless deployment into customer GUIs, updates to client devices.



Key Areas of netPump

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netPump has a broad application for both enterprise and consumer markets with four key areas:

Video Streaming
Business & Consumer

Video SDKs - Video and audio applications where data is streamed.

Consumer: Video content by SVODs, VODs, IPTV, OTT, gaming, tutorials, social media
Business: Training, security, AV logging, records, conferencing

Data Delivery
Business & Consumer

Data App – Downloads or uploads to storage devices on local area or small networks.

Consumer: images, videos, documents transfers
Business: Data, financial, legal, medical imaging and ehealth, intranet and B2B Communications

Infrastructure
Enterprise & Big Data

Data App - Big data movement, access or transit on Wide Area Networks (WAN).

Enterprise customers in IT&C industries, big business, intercontinental networks, government and institutional services

Defence
Security & Military

Data App & Video SDK - Military level security and performance - focus on proprietary fixed hardware deployments.

Public sector and vendors to military, intelligence, security and law enforcement agencies. Security and analytics

Features of netPump

Technology Agnostic	> netPump is technology agnostic, so may be deployed in the delivery of any binary file across a network using common computer platforms and languages including digital rights management (DRM) video players/codecs and devices. > Available on platforms: Windows; Linux; iOS and Android. > Available in programming languages: C#; MS .NET and Java. > netPump Video SDK encodes any file type: AVCHD; HLS; HEVC; H.264; MP4; MPEG-DASH; VP9/VP8; FLV; RTMP; MSS.
Traffic Management	> network conditions are measured at the client. > allows multiple streams of different data to be transmitted through the network at much higher speeds with faster switching between differing video bit rate or data streams. > the netPump video streaming decoder measures the load time of every video segment then manages server requests to optimise traffic and performance.
Lossless Compression	> The netPump Video SDK includes optional lossless compression on the industry standard TS video format (HLS, IIS and HDS).
Move Files Remotely	> Data transfers between machines can be made via a remote device, as netPump Data works both pushing and pulling data between any two or more machines.
Security	> available with up to 2048 bit encryption plug-in – in addition to existing cryptographic protocols, such as AES 128 SSL Layer 2/TLS via HTTPS.
Continuation of Disrupted transfer	> netPump Data proprietary software allows you to continue disrupted or paused transfers from point of interruption, without the need to start transfer again as the service starts from the last copied data segment.

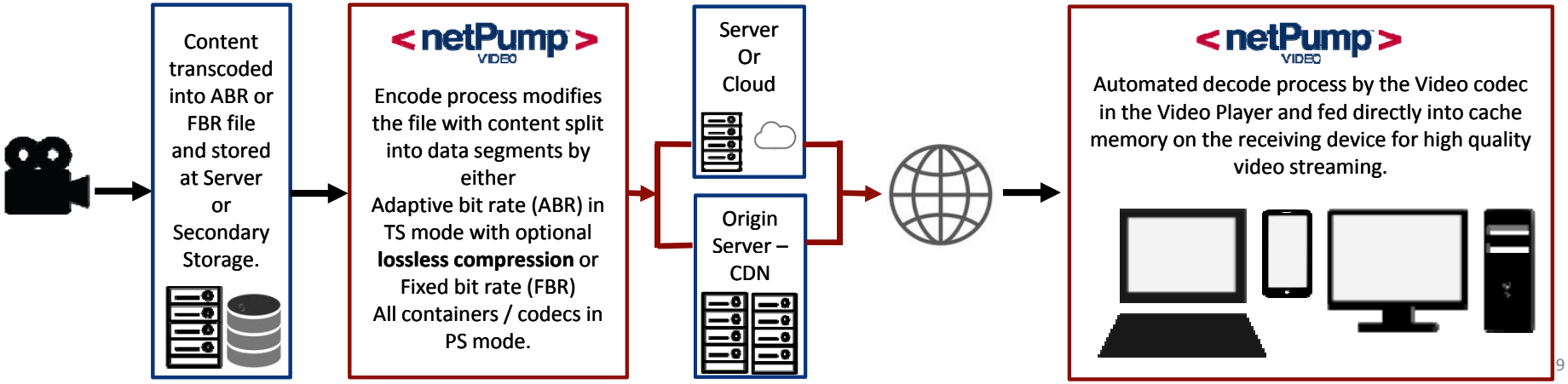
Features (con't) of netPump

Optimises performance	> allows multiple streams of different data to be transmitted through the network at much higher speeds with faster switching between video bit rate or data streams. > no need to monitor bandwidths from multiple sources or switch sources when bandwidths vary. > does not write data to storage media when streaming video and only requiring HTTP GET commands.
Accesses latent capacity to move more data	> up to 10x increase in speed of delivery on high latency network. > more streams of multiple videos can be fed from a single connection.
Acceleration	> moves up to 50% more data per second across a standard network than can be achieved by TCP/IP. > unlike most acceleration technologies, doesn't use UDP transfer protocol so has the reliability of TCP.
Fair Use Guidelines	> can be configured to only operate within fair use guidelines for use of network resources on the internet.
Quality of Experience	> access and view more broadcast quality content. > less demand on power output of viewing devices. > pulls through more data, allows video delivery maintained at higher bit rate for longer on same connection.
Reliability	> reliably delivers actual source file. > monitors message transmission, tracks data transfers to ensure receipt of all packets. > client log, reports and metrics, > network condition monitor at the receiving device.
Low Cost, Easy Deployment	> easily deployed directly or remotely using a Software Development Kit (Video SDK) or App (Data) without the expense and disruption of expensive hardware upgrades to user devices and infrastructure

netPump for Video Streaming

The Process

1. netPump encodes the original file and is split into data segments in either time splitting (TS) mode with optional proprietary lossless compression or by packet splitting (PS) mode.
2. the data segments are optimised to accelerate their delivery through existing infrastructure (cloud, origin server or content delivery network (CDN)) over standard TCP/IP internet.
3. the data segments are reassembled at the receiving device through an automated decode process by the video codec within the video player delivering the actual source file is delivered with no impact on integrity. Data segments are fed directly to **cache memory** and played back from cache on the receiving device to deliver broadcast quality, reliable video streaming with no buffering or jittering.



Video Streaming Benefits

Quality of User Experience

- less buffering and jitter.
- reduces wait times before video streaming starts.
- improves quality on slower connections without hardware upgrades.
- allows delivery of higher quality video content with improved picture quality and faster performance.
- more viewing hours on wireless devices.
- fast and remote installation to users via download to device.

Less Streaming Congestion

- reduces access congestion and play latency.
- reduces network traffic by up to 50% over a given time span.
- scalable, robust video streaming from cloud or webservers.
- only accesses a fair measure of resources over TCP.
- optional Lossless Compression on .TS files.
- increases speed of switching video streams in ABRs.

Lower Streaming Delivery Cost

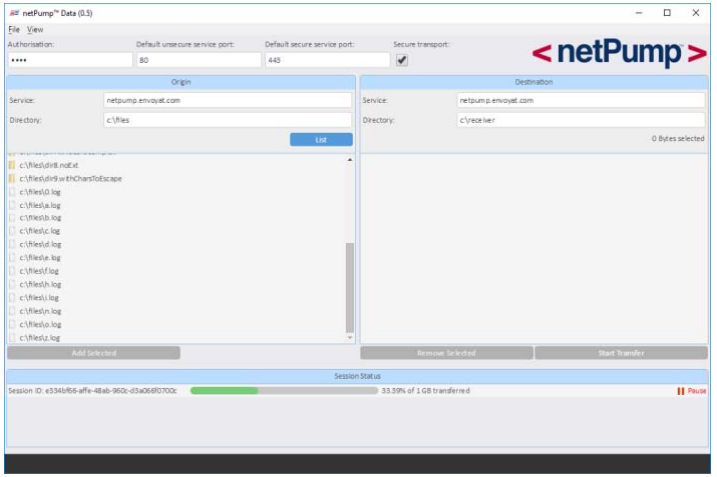
- less cost per gigabyte for video storage, delivery & streaming.
- able to switch to cloud or webserver to access bandwidth based pricing.
- access latent capacity for more data through existing bandwidth on CDN.
- less costs to store and deliver video – and less data costs for viewers to stream video.
- immediate payback on investment.

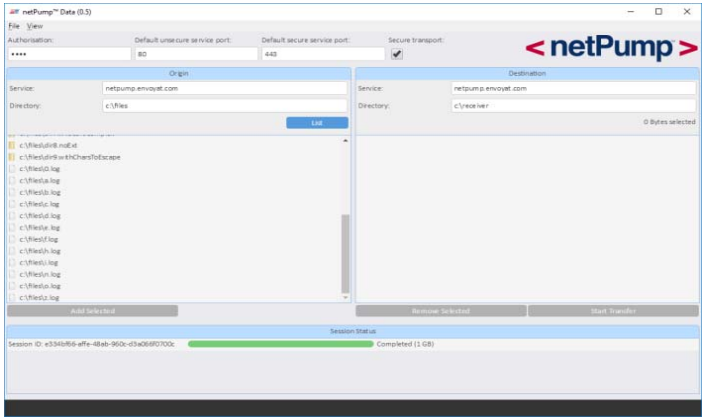
Technology Agnostic

- compatible with all common video formats including the industry standard .TS format.
- compatible with all video players and codecs (including HEVC) and DRM technologies.
- complementary to current compression technologies.

netPump for Data & Infrastructure

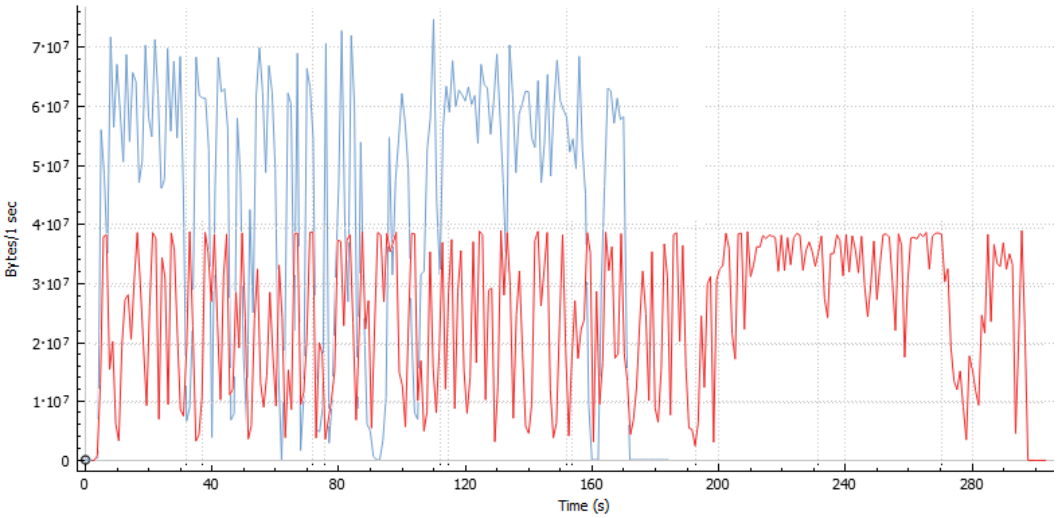
- netPump Data is a delivery technology service that can be used to upload/download and transfer any binary file (small to large files, directories and sub-directories) over a private or public network.
- an accelerated binary data transfer technology, it is agnostic to data, router or relay server type.
- is built on MS .NET and offers GUI and a command line interfaces.
- both interfaces operate on the netPump service which can be loaded automatically on boot, or initiated manually.
- the netPump service is installed on each machine which will be a sender and/or a receiver of files. A netPump service can act as both a sender and a receiver of files.
- when a user requests the transfer of files, it is represented as a *session*. When a 'start transfer' request is created, a unique session ID (GUID identifier) representing the session will be returned in the response. After the session has been created, the user can use the session ID to retrieve further information about the session in progress or to pause/resume a session.
- multiple sessions can run in parallel.
- Remotely manage transfers between two or more machines (via a remote device) without requiring any additional ‘hops’.





Features of netPump for Data & Infrastructure

- **Speed** - increases the speed of data delivery and increases network efficiency - reduces the time taken to download a database or photos, load a complex web page or complete data transfers.
- **Wide deployment capability** - can be deployed at any level – from infrastructure, to CDN or Cloud, to mobile device, serially or in parallel.
- **Intelligent Network Management** - intelligent network metrics at the Client device.
- **Moves more data** - per second as the connection speed increases.
- **File integrity** - delivers the original source file with no impact on quality or integrity.
- **Reduces access congestion** - allowing delivery of the same file to more users simultaneously.
- **Security** - available with up to 2048 bit encryption and can operate in addition to existing cryptographic protocols, such as AES 128 SSL Layer 2/TLS via HTTPS; and requires a new decryption key to individually decrypt each Data segment as every Data segment is individually encrypted when employing netPump's up to 2048 bit encryption plug-in.

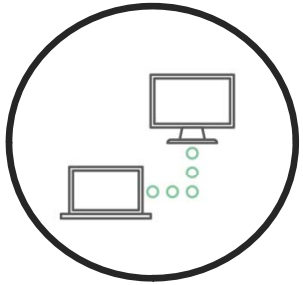


Testing Notes: Copied 2,450 files of differing types and sizes totalling 7GB in size using both netPump (default settings of 8 threads) and Windows Explorer. Both transfers were between a server in Canberra and the same Windows 10 client in Sydney over a 600Mbps link. There was the additional overhead of running a full capture Wireshark which impacted netPump. netPump without Wireshark copied the files in 48% of the time Explorer did.

Data & Infrastructure Benefits

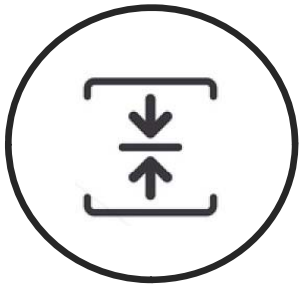
Increased Profitability

- substantially increase margins by reducing the time downloads and **uploads** use network resources as a result of accessing latent capacity of existing network infrastructure.
- significantly reduces data usage.



Network Optimisation

- pure software solution, requiring no physical upgrade to infrastructure, servers or devices that offers network optimisation and traffic management over a standard TCP internet connection.



Increased Data Transfer Speed

- up to 10x increase in speed of delivery of any binary file on high latency network – including both **upload** and download speeds
- moving up to 50% more data per second on a standard network and using significantly less CPU processing power.

Security & Encryption

- available with up to 2048 bit encryption plug-in – in addition to existing cryptographic protocols, such as AES 128 SSL Layer 2/TLS via HTTPS.

Features & Benefits of netPump for Defence

- data transmission, network connectivity, speed, efficiency and security are core considerations in the areas of defence and security.
- netPump has broad application across a range of defence, security and analytical tasks while providing all the acceleration features.
- netPump has the ability to transmit binary data more quickly, reliably and efficiently, especially in areas accessing high latency networks.
- deploying netPump offers unique practical and operational efficiencies in addition to customisable solutions, like discreet access to layered information embedded within a data flow.
- access, move, copy, upload, download files from any machine remotely.
- continue disrupted or paused transfers from point of interruption as the service starts from the last copied data segment.
- the netPump proprietary segmenting data method gives an additional level of security to the standard AES 128 SSL Layer2/TLS security technology as well as a plug-in providing up to 2048bit encryption before, during and after transmission across the network.
- from command communications through to technologies for the theatre of operation, netPump offers the potential to deliver solutions well beyond conventional, commercial constraints.

Key Benefits

- can be deployed at any level in a network
- moves up to 50% more data per second across a standard network than can be achieved by using conventional data transmission technology
- all binary data transferred, regardless of format or content – delivers actual source file
- segmenting of data gives an additional level of security; additional encryption using multi segmenting may also be employed
- accesses latent network capacity with up to 10x increase in speed of delivery on high latency network
- low CPU usage on transmission devices
- operates on TCP/IP with a radio carrier
- a pure software solution, requiring no physical upgrade to infrastructure, servers or devices
- allows fast, easy low cost and low risk deployment
- up to 2048-bit encryption in addition to SSL Layer2/TLS security technology

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