

## INITIATION OF COVERAGE

### A revolution in online video search!

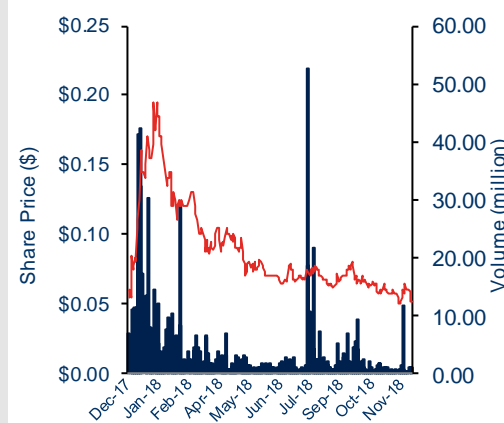
- Linus Technologies (LNU) has patented a technology around virtualising internet video that has the potential to revolutionise the way video is used over the internet. LNU's Video Virtualisation Technology™ (VVE) separates publically accessible video files from the cloud by making it accessible as data and reducing the number of video files to be converted to different formats for playback on various devices, thereby reducing the cost of storage and processing. The service offers significant opportunities for cloud providers, media and entertainment businesses. LNU has embarked on a number of Proof of Concept (POC) trials that have been successful resulting in its first two commercial agreements in the last few months. These are expected to begin generating revenue in 2H19. While we expect CY19 / CY20 to be an exciting period where LNU gains market recognition for its technology and commercialisation, at this point there is significant uncertainty around the quantum and timing of first revenues. Subsequently, we have not provided forecasts or a valuation for LNU, and as such we recommend LNU on a Spec. BUY basis.
- Video files are typically large and modification of the video file is required each time it plays in different video formats, resulting in significant associated storage space. Every video file has a header with rules contained in it governing the playback of that video. LNU has managed to remove or bypass the header file to access the data in the video, thereby using the data and not the whole video. This is known as virtualisation. LNU has thus succeeded in ignoring the rules inside the header to enable the creation of new rules to manipulate the data in the video to open up a myriad of use cases.
- LNU has integrated its VVE into IBM, Microsoft and Amazon's cloud services. It is conducting POCs with Village Roadshow / Warner Bros, and Oklahoma State University (25,000 students). It has signed its first commercial agreements with the Swedish based Newstag, and US based re-seller MediaAMP. It is in a number of discussions with a range of potential customers across different sports leagues and broadcasters.
- The revenue potential outlined in this report covers search, security & defence, anti-piracy and personalised advertising. LNU has c.\$8.2m in cash and was burning c.\$0.85m per month in the September quarter.

No forecasts are available at this stage, given the premature nature of the business.

10 December 2018		
12mth Rating	SPEC BUY	
Price	A\$	0.054
Target Price	A\$	na
12mth Total Return	%	na
RIC: LNU.AX		BBG: LNU.AU
Shares o/s	m	938.1
Free Float	%	83.1
Market Cap.	A\$m	48.8
Net Debt (Cash)	A\$m	0.0
Net Debt/Equity	%	0.0
3mth Av. D. T'over	A\$m	0.251
52wk High/Low	A\$	0.21 / 0.044
2yr adj. beta		1.01
<b>Valuation:</b>		
Methodology		DCF
Value per share	A\$	na
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**Disclosure-**The analyst owns shares in LNU

### 12 Month Share Price Performance



Performance %	1mth	3mth	12mth
Absolute	-8.3	-14.3	29.4
Rel. S&P/ASX 300	-5.4	-13.5	22.3

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## BUSINESS OVERVIEW

LNU has a unique patented software technology that converts existing video into accessible data or virtualised files. While data virtualisation is not new, LNU has pioneered internet video virtualisation technology. LNU's Video Virtualisation Engine™ (VVE) separates publicly accessible video files from the cloud by making it accessible as data and reducing the number of video files to be converted to different formats for playback on various devices, thereby reducing the cost of storage and processing. The service offers significant opportunities for cloud providers, media and entertainment businesses.

LNU has completed preliminary testing and has commenced commercialisation via two recent agreements with Newstag and MediaAMP. LNU has been granted core patents for its VVE technology covering method and system for content delivery across key markets including: US; EU; Sth Korea; Canada; China; Hong Kong, Singapore and Australia. Four additional patents have been granted in the US, and there are two other patents pending and further patent applications in process. The VVE technology has also been integrated into leading cloud platforms including: Amazon Web Services (AWS); Microsoft Azure and IBM Cloud.

LNU acquired the IP from Phoenix Myrrh for c.\$5.4m in November 2015, with the invention established the year before.

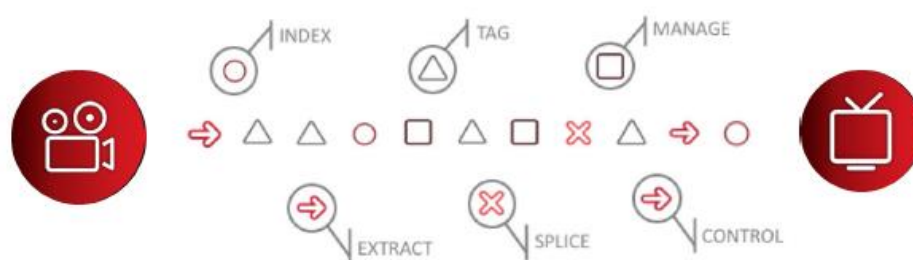
Video files are typically large and modification of the video file is required each time it is required to play in different video formats. This results in significant storage and processing requirements. In order to support various video formats. This creates complexity and results in an increasing number of copied video files and associated storage space.

**VVE simplifies this process. Every video file has a header which manages the video atoms within it and controls the playback of that video and the rules of usage in a certain way. LNU's patent is based on removing or bypassing the header file to access the data of the video, thereby using the data and not the whole video. LNU has managed to ignore the rules of usage in a video file so as to create its own rule and manipulate the data to open up a myriad of use cases.**

### Three Simple Steps – sort of!

VVE separates the traditional video file and converts it into two parts, the VDNA (Video-DNA) which is a large file and the vStub (a small index file, approximately the size of a text email). By modifying the vStub, without touching the VDNA, a user can access the VDNA data to index, tag, parse, splice, manage and manipulate any video stream in real time. VVE then applies processes to only address the vStub file (kilobytes in size), thereby significantly reducing storage requirements.

Figure 1: Mechanism of VVE – workflow



Source: Linus Technologies Ltd

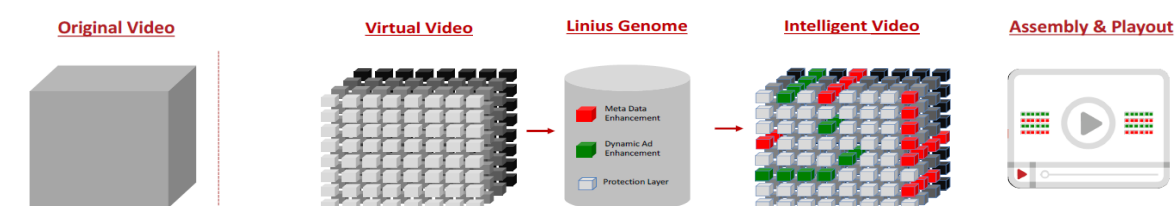
- **Extract data from the video to create virtual video data** – The traditional video is typically an inflexible impenetrable file. VVE manages to inspect, retrieve and extract data (VDNA and vStub) from the original video and prepares it for further application. This is known as “virtualisation”.
- **Developing data to create an intelligent file** – The available flexible audio and video data are developed with a Linus Genome, which includes meta-data, personalised advertisement and privacy layers. This means the video can be programmatically modified and enhanced which offers meaning and value to the video. LNU calls this “intelligent video”.

- **Reassemble video** – The VVE reassembles the intelligent video, and customises it based on each individual viewer. The vStub (small container) connects with VDNA (original audio and video content) at the source location and reassembles a version of the video. This means the VVE seamlessly transmits files by using one vStub container. The VDNA files that are extracted and transmitted from the original videos are binary data, which cannot be reassembled without vStub. The resulting video is ready for playback in various devices, including TVs and smart phones.

Once the intelligent video is created, the playout is delivered to the needs of the user:

- **Search** – Finding specific segments of video
- **Contextual Ads** – Frame level content is used to match ads
- **Secure Content** – Playout only happens with the right authentication

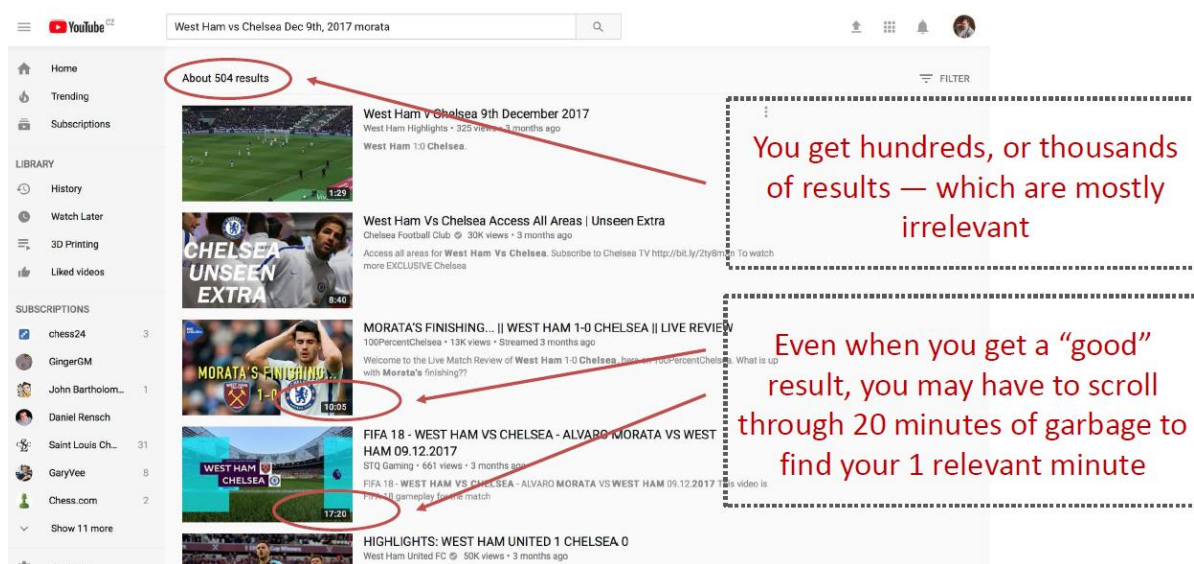
Figure 2: 3 step VVE process



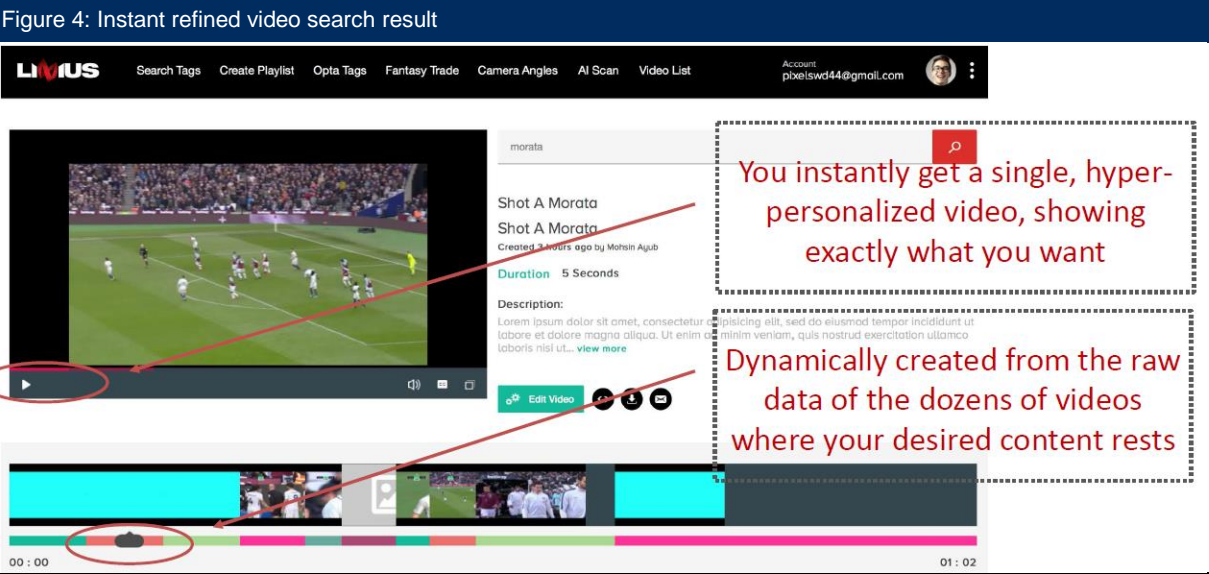
Source: Linius Technologies Ltd

Even though video is digital, legacy formats make it difficult to access the underlying data inherent in it. Although most other data has been virtualised, video hasn't, despite an array of scientific advances. This means that one cannot search across videos; the entertainment industry loses c.20% of revenue to piracy, despite consumers conducting almost all of their daily banking online without issue. It also means that <0.3% of all security video is ever analysed.

Figure 3: Searching video is an onerous task today



Source: Linius Technologies Ltd



Source: Linius Technologies Ltd

The existing video workflow process is a legacy of pre-digital video days. Managing video assets is a complex, labour-intensive and expensive process for infrastructure providers, content owners and broadcasters. The potential storage cost savings could be as much c.75.0%. The video value chain was worth c.US\$16.5bn in 2014, but is bloated with costs through the eight steps from recording to audience playback.



Source: Accustream Research 2014

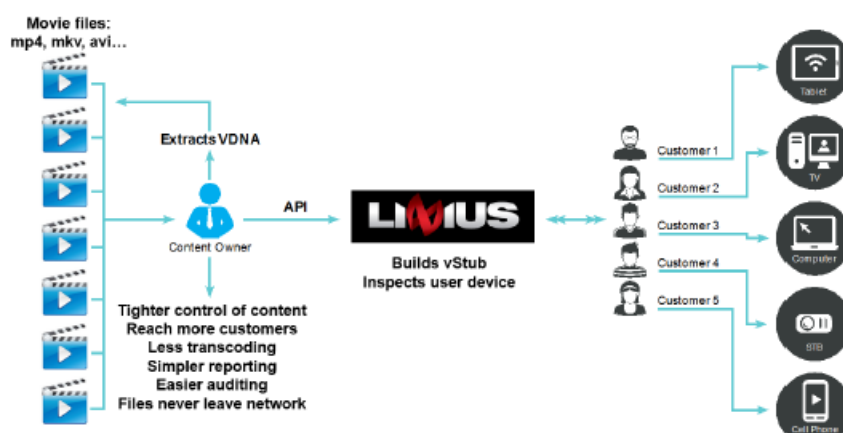
Video Customisation

LNU removes complexity from the video workflow by managing data within the file at the source. LNU extracts a tiny index vStub file from a video asset. Modifying the vStub lets users edit and manage video – leaving the vast bulk of the VDNA file untouched. LNU is designed to help users execute work that currently demands crunching several huge multi-gigabyte files, by instead dealing with only a few kilobytes of data.

Video content owners expect to maintain and control the ownership of video content while maximising customer reach, in a fashion that effectively monetises their content. VVE facilitates video content owners in achieving these goals as more formats and multiple end-user display devices can now be incorporated with minimal vStub file size adjustments. Figure 6 illustrates how different formats of video can be played using various display devices.



Figure 6: Enhancing DNA of an internet video file



Source: Linus Technologies Ltd

## PROOF OF CONCEPT (POC)

LNU remains in the early phase of its development with most of its history focused on proving its technology works.

LNU has engaged in POC and integration agreements with leading cloud operators such as IBM Cloud, AWS and Microsoft Azure. According to Cisco's Visual Networking Index, video streaming is expected to account for more than 82% of internet traffic by 2021, up from 73% in 2016. IBM, AWS, and Microsoft are leaders in video cloud services and have been investing heavily in the video sector. These providers are competing to own video content, connect data between tools and artificial intelligence (AI), search videos more efficiently and be able to customise and monetise videos quickly. LNU believes that its VVE provides the missing link that tackles the challenges being encountered.

Video cloud service providers are engaged in moving the production software / hardware to the cloud as opposed to the traditional mechanism of online deployment, and they are also moving aggressively into the area of AI (Artificial Intelligence) video recognition. However, even with AI and production in the cloud, they do not appear to be able to achieve the sort of hyper-personalised results that is the true value of AI in achieving per-frame recognition.

If one takes the example of the sports broadcasting industry, Amazon, Google or IBM can each deliver the production work in the cloud to reduce costs for the broadcasters to create a standard highlights reel, and they can all tag each frame of video, so that every time code is known. However, this just relates to reducing production cost and shifting capex to opex. The real value is generated in being able to hyper-personalise video, on demand, and this is the technology that LNU brings to the market.

We profile the POC agreements entered into to date:

- October 2017 – Integrated VVE into IBM's Cloud service.
- December 2017 – LNU integrated with Microsoft's suite of cognitive AI services for video with its core VVE offering.
- January 2018 – LNU launched its VVE as a SaaS platform following a trial involving a large-scale virtualisation of Instagram, the "self-service" version of VVE – Linus Video Services (LVS). Developers can build new products and businesses on top of VVE, through a suite of APIs built for global scale (<https://lvs.linus.com/>). Users are able to log on and pay to virtualise their videos themselves, without the requirement of LNU resources. Making VVE universally available is a key component of LNU's efforts to scale its business. It has been deployed on AWS.

- February 2018 – After engaging Warner Bros in a Proof of Value (POV) in anti-piracy in October 2017, LNU signed a collaboration agreement with Warner Bros. Entertainment Inc. to conduct a technical pilot test in Australia of the VVE in a transactional video on demand (TVOD) streaming and content platform, which provides content protection through distribution to an end-user. In the annual update, LNU noted that the POC is nearing completion of deployment, with the focus on a technical trial to demonstrate the analytics and KPI capabilities of virtual video.
  - In the September Quarterly, LNU noted the Transactional Video-On-Demand (TVOD) test platform had been constructed by LNU's system integration partners, and the original agreement has been extended to include Roadshow Films as the in-country partner for the test. Formal testing of the POC is expected to begin in November and take c.30 days to complete. LNU would expect commercialisation of this opportunity to occur via IBM or its partners.
  - We understand there are c.250m movie streams per month globally, and that IBM aims to capture a portion of this market, the revenues from which would be shared with LNU. While it is speculative to put numbers around where this relationship may go in the future, a simple pricing strategy of \$1-\$2 per movie stream would translate to a significant revenue stream for LNU.
- March 2018 - LNU and Oklahoma State University (OSU) signed a POC agreement to test the power of LNU's cognitive search capability, along with IBM Watson, to transform OSU's vast video library into data. The purpose of the POC will be to show, for the first time, how users will be able to search within videos and instantaneously return only the relevant parts of a video or videos, stitched together into a personalised search result. This is standard practice with text based search. Only Linus can do this with video. OSU has over 25,000 students and has a video library of over 10,000 hours across academia, sports, alumni relations and student life. There are 4,724 Universities and Colleges in the US.
  - One example would be where an economics student could search for the reference 'balance of payments' across multiple years of lectures and effortlessly stitch a video together containing the relevant information. In the absence of LNU, this would involve manually trawling through every lecture individually. In October, this POC went "live" with the initial focus being to provide search capability across "famous faces within the context of the University". Details of the results will be released upon completion of the trial.
  - In our discussion with OSU, the manager of the digital video network was able to search for a sports coach's face and received three pages of results, which were then stitched together in a new video clip, within the space of about two seconds! This would be considered a manual search, but when every aspect of a video file can be codified into data, the granularity of the search capability and the various applications could be many orders of magnitude.
- March 2018 – LNU signed an agreement with US-based MediaAMP Inc. to test in a POC project the power of LNU's Cognitive Search, along with leading artificial intelligence provider, IBM Watson. MediaAMP serves a customer base of over 45 schools including major university systems like University of California, University of Washington and Arizona State University, providing a video-first digital asset management platform, underlining technology and support. The purpose of the POC will be to show how users can search within videos and instantaneously return only the relevant parts of a video or videos, stitched together into a personalised search result. Upon successful completion of the POC, MediaAMP intends to integrate the LNU technology into the MediaAMP platform under license on commercial terms. MediaAMP indicated that the technology could be integrated into its platform making video accessible as data, meaning its customers will have the opportunity to unlock boundless options across vast collections of video content. This POC arrangement led to a commercial agreement which is referred to below.

## COMMERCIALISATION BEGINS

LNU has commenced the commercialisation process of its VVE technology with two recently announced agreements with international parties.

### Newstag – July 2018

The first agreement is with a Stockholm based video news service, Newstag to deliver hyper-personalised news experiences with a social impact. Newstag aggregates content for more than 20 broadcasters and agencies globally including: AP; AFP; CNN and Bloomberg. Newstag is a leader in using data to tailor content experiences for users in more than 150 countries.

Initially, Newstag is to deploy the LNU search solution across the Newstag site, allowing users to search news archives and generate their own personalised news experience. The LNU technology will also be deployed to the Newstag workflows providing both improved efficiency and enhanced personalisation to news feeds currently being provided to broadcasters around the world.

LNU is to receive monthly license fees, in addition to US\$1 per video virtualised and US\$40 per thousand videos assembled (4 cents per video) – discounted to US\$10 per thousand (1 cent) until a future commercial deal is finalised. Revenue to be generated is dependent upon take-up of the service, and LNU or Newstag have not provided clear guidance on their expectations for this.

Once deployed, LNU and Newstag are expected to work together to sell the capability to the thousands of news broadcasters and news content providers globally, including but not limited to existing Newstag clients.

In a sign of confidence by Newstag in LNU, Newstag chairperson, Ph.D Camilla Anderson has been appointed to LNU's Advisory Board to facilitate the combined go to market plan.

The market opportunity is potentially significant with news consumption showing substantial growth. According to Nielsen, in the US alone, adults over 18 watched more than 27.0bn minutes (c.450.0m hours) of national cable news programming per week. Cable TV saw the largest increase in news consumption across all media, with an increase of c.18% yoy. Deloitte Global indicates that at least 50% of adults in developed countries will have at least two online-only media subscriptions, which could double by 2020.

A leading brand such as Newstag serves to validate LNU's solution and aids in rapidly scaling the business. In the September Quarterly release, LNU noted that this agreement has now gone "live" and LNU assert that it is contributing to future deals in the news and sports sector.

### MediaAMP – September 2018

LNU entered into a strategic partnership with US-based higher education cloud services provider, MediaAMP Inc. MediaAMP provides a proven cloud management hub that unlocks organisational silos. It provides a secure and scalable AI driven cloud platform offering unique services and solutions for the management, storage, distribution and protection of digital assets, artefacts and media.

MediaAMP will integrate LNU's VVE with its video-first digital media asset management platform (AMP). MediaAMP is expected to provide the VVE technology to its current and future education clients throughout the US. MediaAMP's customers include the University of Washington, the University of California and Arizona State University.

The partnership follows a successful POC conducted in March 2018. The POC validated the unique power of LNU's cognitive search – paired with AI services – to enable users to search for any object or action within a digital video catalogue and instantly play the desired clips. By integrating the search and assembly solution, MediaAMP can empower universities and colleges across the US to enable authorised people to programmatically search, playback and share any digital video content. One example provided was where a student or faculty member could search for, and immediately stitch together, instances where the phrase "required dosage" appears across years of recorded lectures, with no manual scouring or editing of video footage required.

The attraction for MediaAMP is LNU's ability to index video files, search and immediately compile for playback. This should enable students and staff to share specific video content without undue cost or delay associated with manual video manipulation. The video data can also be analysed and leveraged by applying AI or programmatically inserting business rules.



Higher education institutions across the US etc. keep massive archives of digital video content across a multitude of faculties, business groups and other bodies – from academic videos, to sports, alumni and promotional content.

MediaAMP will purchase LNU video virtualisation and search solutions for re-sale to its education clients throughout the US. MediaAMP is aiming for a launch in 1QCY19. Revenue to be earned under the agreement will depend on the level of re-sales and take-up of the integrated product offering.

This arrangement looks similar to the OSU arrangement, but MediaAMP is a re-seller arrangement whereas OSU has internal digital video management, which may be applied to other institutions that have the same internal capability.

### **Commercial SaaS Platform – October 2018**

Following on from the launch of LNU's SaaS technology in January 2018, it has proceeded to the commercial launch of its SaaS Platform. The self-service platform delivers all the technology, tools and support to independently harness video virtualisation, without any involvement of LNU resources.

Included in this launch, is a beta version of LNU's cognitive video search solution, utilising Microsoft's AI tool, Video indexer. LNU provides an embeddable search widget, enabling organisations to deliver granular video search and hyper-personalised content experiences in a myriad of commercial applications.

The commercial launch is critical to LNU's goal of scaling rapidly and making the world's video accessible as data.

Customers can create a LVS account and independently utilise the VVE via a suite of APIs. Key target markets include:

- Businesses that can immediately plug-in and perform granular searches across their video archives using the embeddable search widget
- Developers that can use the APIs and development kits to build powerful new applications
- System integrators that can deliver new services to clients

The global SaaS market for business applications is expected to grow by c.16.4% (CAGR) to c.US\$94.9bn by 2022 (BCC Research). Gartner predicts the overall public cloud services market should grow c.21.4% this year to c.US\$186.4bn.

Each LNU account will be charged monthly via credit card in USD at specified rates, based on the number of video assets virtualised and API calls made. Revenue generated will be a function of take-up of the service, and LNU expect the LVS service to be the largest contributor to revenue over the medium-term.

Although LNU has commenced its commercialisation phase and has struck some interesting agreements, it has also fallen behind its own publicly disclosed goals. It is not surprising that this would happen as in developing businesses, "it always seems to take longer than expected", and LNU is no exception.

At this stage it is difficult to assess the probability of success in LNU's commercialisation efforts. There are no locked in revenue streams emanating from the commercial arrangements recently announced. In addition, the arrangements do not have strong brand name recognition in the local market with which to attribute value to.

It is also difficult to assess whether consumers and business enterprises will actually pay, either directly or through some advertising model, for this unique service offering, as Google has made successful in the arena of text. We think market confidence will grow if a major sporting organisation takes up this service where the revenue to LNU can be clearly understood and measured.

This is very much a "watch this space" phase for LNU.

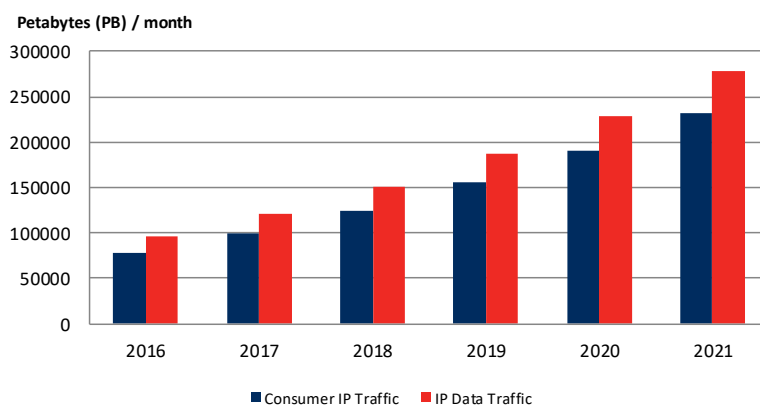
## INDUSTRY OVERVIEW

The growth in internet traffic and video traffic over the internet has been startling and is expected to continue to be strong.

According to Cisco, the increase in the number of internet users and internet speeds is expected to drive a c.24% CAGR in global IP traffic between 2016 and 2021 from c.1.2 ZB pa (zetabytes = 1,000 exabytes) to c.3.3 ZB pa. Global IP traffic is expected to increase c.3x over the five years to 2021, which would result in a c.127x increase from 2005. Global internet traffic per capita is also growing strongly with per capita consumption expected to be c.30 GB (gigabytes) by 2021, up from c.10 GB per capita in 2016.

Video over the internet is driving overall internet traffic growth. Cisco estimates that global IP video traffic may account for c.82% of all consumer internet traffic by 2021, up from c.73% in 2016. This implies a c.31% CAGR in internet video traffic. Live internet video is expected to account for c.13% of internet video traffic by 2021 and grow over 15x in the five years to 2021. The rapid growth in video traffic may be attributable to the increasing popularity in OTT (over the top) video streaming services and the increase in the number of connected devices. By 2021, it is expected there will be c.3.5 connected devices per capita, up from c.2.3 networked devices per capita in 2016.

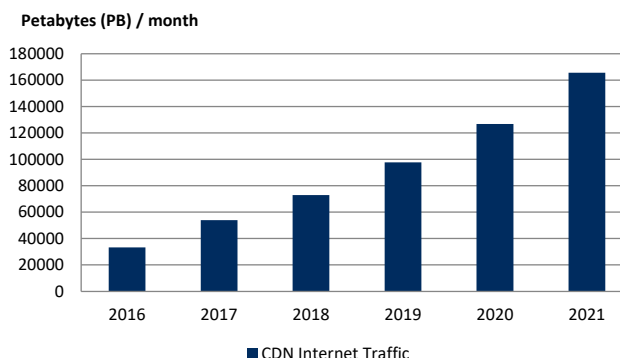
Figure 7: Internet traffic growth



Source: Statista 2018, Patersons Securities Ltd

CDNs (Content Delivery Network) are expected to remain a preferable method of delivering online video content. According to Cisco, global CDN traffic is forecast to grow from 38,340 PB (petabytes) per month in 2016 to 165,651 PB per month in 2021 at a CAGR of c.44%. It is also expected that c.77% of all internet traffic will travel through a CDN by 2021, up from c.67% in 2016. The substantial and growing volume of internet video files increases the need for transforming these into usable data suitable for various business applications.

Figure 8: Content delivery network (CDN) traffic



Source: Statista 2018, Patersons Securities Ltd

Consumer Video-on-Demand (VoD) traffic should nearly double by 2021 equating to c.7.2bn DVDs per month.

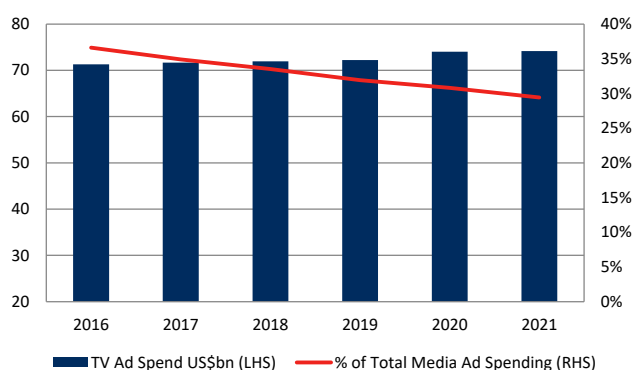
Internet video surveillance has burst into the spotlight over recent years due to terrorism and crime. It increased c.72% in 2016 to 883 PB / month and it is expected to increase c.7x between 2016 and 2021. By 2021, it is expected that c.3.4% of all internet video traffic will be due to surveillance, up from c.1.8% in 2016.

Research & Markets estimates the global video surveillance market to be valued at c.US\$48.7bn by 2021 for a CAGR of c.11.9%.

According to Accenture's Video Analytics Report, c.98% of CCTV footage remains unseen and only c.0.2% of all US federal video footage is ever viewed. The evolution of VVE should mean that the vast volume of video files could be analysed efficiently to achieve better outcomes.

Personalised advertising is increasingly viewed as a powerful tool to deliver consumer targeted messages. Targeted advertising campaigns obtain an average c.2.7x higher revenue per ad than non-targeted ones. This is driving businesses to increase spending on personalised video markets. TV and digital video advertising comprise a significant portion of total media ad spending. e-Marketer suggests that US TV ad spending is estimated at c.US\$71.3bn in 2016 and would grow only modestly to c.US\$74.2bn in 2021. Although the portion of total ad spending is slowing it is expected to remain at a robust c.29% in 2021.

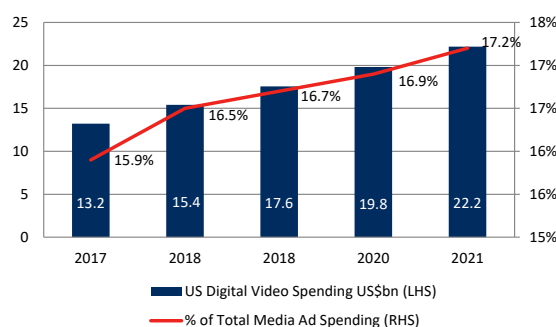
Figure 9: US TV ad spending



Source: e-Marketer, Patersons Securities Ltd

The US digital video ad spending market is estimated at c.US\$13.2bn in 2017 and is forecast to grow at a CAGR of 13.8% to reach c.US\$22.2bn in 2021. An increase in consumer preference for digital video platforms such as OTT over traditional pay TV options is expected to drive the digital video ad growth. Advancing technology enables real time dynamic video ad insertion offers precision for advertisers, which should drive further investment in the US advertising market. LNU's platform enables personalised pay TV ads, similar to those seen in personalised social media ad campaigns.

Figure 10: US digital video spending – CAGR 13.8%



Source: e-Marketer, Patersons Securities Ltd

Copyright piracy and trademark infringement is a significant threat to the film industry. The MUSO global film and TV piracy report in 2016 indicates there were c.191bn visits to piracy sites in 2016 (c.53 visits per user), which is expected to grow significantly due to the growth in the number of connected devices per person. The

global value of digital piracy in movies, music and software was estimated at c.US\$213bn in 2015 and has been projected to grow to between c.US\$1.9tn and c.US\$2.8tn by 2022 by Frontier Economics. LNU's patented technology is able to tackle film piracy and could be a significant long-term earnings driver.

## INDUSTRY DISRUPTION – BROADCAST NEWS IN TRANSITION

Given the explosion in internet video usage, it is worth pondering the real world implications for one sector as an example.

In 2017 the Pew Research Centre found that that c.50% of the US population still often receive their news from TV, but c.43% of Americans now regularly access online news sources. In 2016, the portion of Americans accessing news from TV was c.57% and online news was c.38%. In the space of one year, the gap had narrowed from c.19.0% to c.7.0%. Millennials were also twice as likely as their parents to source their news online.

In the broadcast model, news has technically been free for the consumer in exchange for being confronted with advertising. The development of cable TV news showed that consumers were prepared to pay for news content. The emergence of consumer funded news has also impacted delivery mechanisms to connect consumers with information that matters to them. Subscription media services such as Spotify and Netflix have conditioned consumers to pay a small fee for quality content.

If subscription media is the future, then video is the prevailing form, with video streaming services driving the explosion in internet traffic. This challenges the traditional Broadcast News model and could result in a transition to a Microcast model.

Reuters has found that c.79.0% of the world's senior digital news leaders are investing more in online news video, but there is caution about the investment required to scale video.

One solution is an AI-enabled news-as-a-service, which hyper-personalises content, curated by an algorithm that learns consumer preferences over time. For sports fans, this means that all the latest content from a weekend's matches automatically compile specific highlights desired, in a customised video to a designated device. Production costs are negligible, but the number of hyper-personalised video streams is infinitely scalable.

If consumers demonstrate demand for such a service then the funding model is likely to change and involve consumption-based micro-payments to news broadcasters. LNU's VVE technology results in turning static video into dynamic searchable data to facilitate hyper-personalisation.

Given that AI is already being used to automate and commoditise news production and highlights packages, it seems feasible that another step in virtualisation is just around the corner.

The production and editing cost savings in the news media from applying VVE could be enormous according to people that have worked in the TV Broadcast sector.

## FINANCIALS

LNU remains at an early stage of its development, as it is pre-revenue and burning c.\$0.8m per month. It has over \$8.0m in cash but is likely to need capital in 2019. In 1Q19 it managed to spend less than the forecast from the prior quarter.

The premature nature of the business means that it is currently impossible to develop sensible forecasts and an absolute valuation for the business. We can however profile the nature of the revenue streams that could be generated and what that might look like if LNU achieves a level of success.

Figure 11: Quarterly cash flows

	4Q16	1Q17	2Q17	3Q17	4Q17	1Q18	2Q18	3Q18	4Q18	1Q19
Net Operating Cash Flow (\$000's)	-454	-602	-655	-803	-992	-1,468	-1,966	-2,596	-2,465	-2,535
Cash Position at end of Qtr (\$000's)	3,275	3,173	2,767	1,951	959	975	3,533	10,657	10,766	8,231
Burn Rate / Month (\$000's)	-151	-201	-218	-268	-331	-489	-655	-865	-822	-845
Survival Period (mths)	21.7	15.8	12.7	7.3	2.9	2.0	5.4	12.3	13.1	9.7

Source: Linus Technologies Ltd, Patersons Securities Ltd

## Revenue Model

LNU has targeted four markets although there are likely to be many more over time. Despite the goal of building business across four market segments, it is really the Search category that is the main target in the short-term.

Figure 12: Revenue model summary

Product	Description	Proposition	Market Size	Pricing
Search*	<ul style="list-style-type: none"> <li>Product - VVE, Player and Artificial Intelligence</li> <li>Requires little to no integration</li> <li>Delivered with Microsoft</li> </ul>	<ul style="list-style-type: none"> <li>World's first personalized video search results</li> <li>World's 1st commercial use case for cognitive video intelligence</li> </ul>	<ul style="list-style-type: none"> <li>Excess of 10B video searches a day</li> <li>~5x this across target markets</li> </ul>	<ul style="list-style-type: none"> <li>0.075 cents per search + 0.01 cents per ad served</li> <li>Paid by content owner</li> </ul>
Security & Defense*	<ul style="list-style-type: none"> <li>Product - VVE, Player and Artificial Intelligence</li> <li>Requires little to no integration</li> <li>Delivered with Microsoft/onsite</li> </ul>	<ul style="list-style-type: none"> <li>Analyze and immediately create relevant security videos</li> <li>World's first use case of AI to create video</li> </ul>	<ul style="list-style-type: none"> <li>72M video hours acquired per day, only 0.2% is viewed</li> <li>*Linus makes all instantly available</li> </ul>	<ul style="list-style-type: none"> <li>License fee + 0.075 cents per search</li> <li>Paid by government agency</li> </ul>
Anti-Piracy*	<ul style="list-style-type: none"> <li>Product – VVE, Player and content protection suite</li> <li>Requires integration with Video Content Management System</li> <li>Delivered with IBM</li> </ul>	<ul style="list-style-type: none"> <li>Anti-piracy from production to retail</li> </ul>	<ul style="list-style-type: none"> <li>Costs US economy \$20.5B pa</li> <li>432M regularly watch pirated content online</li> </ul>	<ul style="list-style-type: none"> <li>License + 0.02 cents per api call</li> <li>Paid by studio</li> </ul>
Personalized Advertising**	<ul style="list-style-type: none"> <li>VVE, ad server, player sdk</li> <li>Requires integration with workflow</li> <li>Delivered on Microsoft</li> </ul>	<ul style="list-style-type: none"> <li>Hyper-personalized advertising</li> <li>Increased advertising yields</li> <li>No ad blockers</li> </ul>	<ul style="list-style-type: none"> <li>In the US, \$90B pa market</li> <li>Ad blocking to cost advertisers \$35B pa</li> </ul>	<ul style="list-style-type: none"> <li>0.01 cent per ad served</li> <li>Paid by broadcaster</li> </ul>

Source: Linus Technologies Ltd

## Search

LNU believe the Search market offer potential to generate revenue of greater than \$60m pa. This assumes a c.2% market share. If one assumes LNU charge 0.075 cents per search, it would take c.80bn searches to achieve the revenue outcome. At a c.2% market share this implies there would be c.4.0tn searches pa.

LNU has indicated that current online metrics show there are currently c.10bn video searches per day or c.3.65tn pa. LNU also highlight there are currently 5bn video views per day on YouTube and Snapchatters watch 10bn videos a day. YouTube holds a c.18% market share of video on the internet. The video market is growing between 20% to 40% pa.

## Security & Defence

LNU's offers technology that analyses videos on a large-scale and immediately compiles the relevant security video based on required inputs, significantly reducing time spent on video analysis and storage space. Government agencies and video security firms are the main target customers for this application.



LNU indicate that c.72m hours of video surveillance footage is collected daily. If LNU service c.2% of this market it believes it could generate revenue of c.\$60m pa. This would come in the form of an upfront license fee per "seat", an ongoing "seat" license fee and a pay per search fee. There would also be ongoing support and maintenance of c.20% of the upfront seat fee, or c.\$12m pa.

Video surveillance is estimated to be a c.US\$40bn market and video surveillance absorbs c.20% of the UK criminal justice's annual budget. This implies there is ample opportunity for a service that is exponentially faster than current capability and significantly reduces storage space in the process.

### **Anti-Piracy**

Piracy of film currently costs c.US\$20.5bn pa in the US film industry and c.432m internet users regularly pirate content. LNU's anti-piracy product includes the VVE, a video player and content protection set delivered with IBM. This product controls espionage and hacking by applying a protection layer over video content, making the original video inaccessible unless the content owner's permission is granted. If one assumes LNU could capture c.5% of the studio content market at 0.075 cents per view, LNU could generate revenue of c.US\$30m pa. This would imply c.400m views via the protected content mechanism.

Another way to think about revenue potential is to start from the top down. Box office takings for the top 100 films in 2018 to date is c.US\$21.0bn (source: box office mojo). Stolen film typically represents a c.19% loss of revenue or c.US\$4.0bn. If c.40.0% of this can be prevented, that represents a return to studio revenue of c.US\$1.6bn. This excludes assumptions on high-end TV (Game of Thrones). One could charge c.20% of returned revenue to arrive at a market opportunity of c.US\$320m+ from studios alone. Achieving c.10% penetration of this market opportunity would result in c.US\$32.0m pa.

### **Personalised Ad Market**

US TV advertising market revenues are c.US\$70.0bn pa, with the total number of ads viewed being c.9.0tn to c.12.0tn pa. There are c.225.0m consumers that are active users of Ad Blockers, which is expected to cost c.US\$35.0bn by 2020.

LNU uses VVE, and API to ad server, Linus Player and a SDK (Software Development Kit) to online customers (Over the TOP – OTT), delivered through the partnerships with Amazon, Microsoft and IBM. LNU's technology controls Ad Blockers, which saves the cost incurred due to them.

If LNU were able to charge \$1.60 / thousand Ads or 0.016 cents per Ad served, at c.10.0tn Ads, the market opportunity in the US equates to c.US\$16.0bn. A c.1.0% market penetration would equate to annual revenue of c.US\$160.0m.

Figure 13: Capitalisation structure

<b>Total Shares on Issue</b>	<b>938.1</b>
<b>Listed Options</b>	<b>62.1</b>
<b>Unlisted Options</b>	<b>167.1</b>
61.5m @ \$0.05 Expires March 2019	
11.5m @ \$0.045 Expires November 2019	
63.76m @ \$0.075 Expires May 2019	
3.38m @ \$0.07 Expires December 2019	
3.38m @ \$0.075 Expires December 2019	
3.38m @ \$0.08 Expires December 2019	
3.38m @ \$0.085 Expires December 2019	
10.0m @ \$0.22 Expires September 2019	
1.0m @ \$0.17 Expires February 2020	
3.75m @ \$0.045 Expires June 2021 ESOP	
2.0m @ \$0.05 Expires June 2021 ESOP	
<b>Total Fully Diluted Shares on Issue</b>	<b>1,167.3</b>
<b>% Owned by Management</b>	<b>7.5%</b>

Source: Linus Technologies Ltd, Patersons Securities Ltd

## COMPARABLE COMPANIES

The general focus of virtualisation is on the server, desktop and application segments. Key companies in this space are VMware (NYSE: VMW) and Red Hat Software (NYSE: RHT), both of which are multi-billion listed businesses. VMW generated revenue of c.US\$8bn in FY18 and RHT generated revenue of c.US\$3.0bn in FY18.

VMW provides server, network and desktop virtualisation software products through VSphere, NSX and Horizon products. RHT provides server and workstation virtualisation through its JBoss Enterprise Application Platform that helps managing technical workstations and servers.

IBM has recently announced a c.US\$34.0bn offer for RHT, equating to a c.11x revenue multiple, providing an endorsement of the scalability of its software.

LNU is different because it is the first of its kind to focus on video virtualisation, which should provide it a first mover advantage, at least, in building its business.

## KEY RISK FACTORS

### Intellectual Property (IP)

LNU has indicated it holds fully granted patents in the US, EU, Canada, S. Korea, PRC, Hong Kong, Singapore and Australia. It has also filed four continuation patents that have been granted in the US, with more patents pending and applications in progress. LNU has 12 patents granted to it for method and system of content delivery, with five of these in the US (US Patent No. 8,893,203, 9,544,657, 9,516,392, 9,918,134, and 9,955,222). Notwithstanding the patent protection, there is some risk that LNU's IP could be challenged or the cost of doing so could be costly.

### Technology Risk

LNU is an early stage developer of a disruptive technology that is only just beginning to be commercialised. It is not yet clear whether the technology can be deployed at scale or whether there are alternative methods to deliver a similar outcome. The quality of the partners LNU is engaged with does provide encouragement that its technology is leading edge, commercially applicable and necessary for a number of industry sectors.

### Security Risk

LNU's technology could conceivably be subject to security breaches that may erode customer confidence, or the presence of "bugs" that may impact LNU's brand, with partners and customers walking away before they have embedded LNU's technology into their business processes.

## Commercial Risk

The pace of technological change can lead to different customer needs, and LNU may need to adapt to such changes to avoid obsolescence, and such an adaptation may negatively impact its prospects. Given the current stage of development, it is premature to argue that technological change has gone beyond LNU's technology platform.

One of the other commercial risks is the rate of ramp up in usage. LNU's potential customers are likely to be large organisations that may need to unwind or navigate around existing commercial arrangements to adopt the LNU service. This may take longer than the market anticipates.

## Key Person Risk

The loss of key personnel would negatively impact its ongoing operations and future prospects. Key personnel have been incentivised with options and an employee share plan.

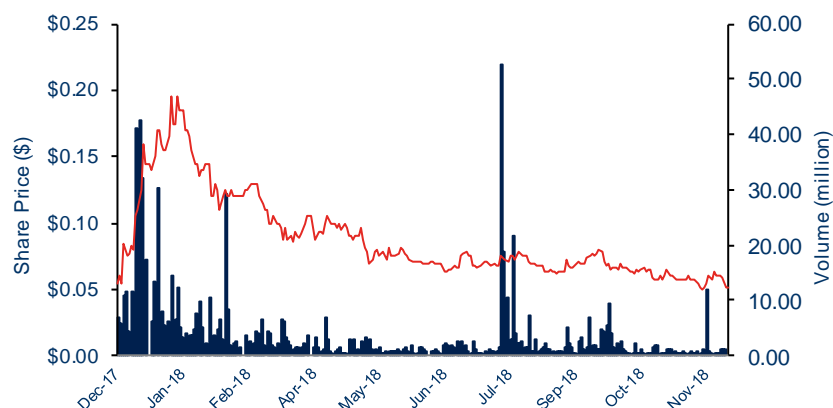
## BOARD / MANAGEMENT

Figure 14: Key person profiles

Name	Position	Shareholding	Description
Gerard Bongiorno	Executive Chairman	28,083,334	Bongiorno is the Principal and C--CEO of Sapient Capital Partners, a merchant banking operation and has over 30 years experience in capital raisings and corporate advisory work. Prior to forming Sapient (formerly Otway Capital), Bongiorno was Head of Property Funds Management at Challenger Financial Services (CFG) and was Group Special Projects Manager at Village Roadshow. Bongiorno began his career in the insolvency and corporate finance division of KPMG. Bongiorno's interest includes 20m options of which 10m had vested.
Chris Richardson	CEO	20,000,000	Richardson is an experienced internet video executive with more than 20 years industry experience. Richardson has held senior level roles across several private and public video technology companies across US, Europe and Asia. Richardson also has 10 years experience in Silicon Valley, with product management roles for several VC funded start ups, including U4EA Wireless and NextHop Technologies.
Steve McGovern	Non-Executive Director	40,000,000	McGovern is founder of Dubber Pty Ltd. He has over 25 years' experience in the fields of telecommunications, media sales, pay TV and regulatory. McGovern has been a senior executive of several established companies, both domestically and internationally, which have been primarily associated with new and emerging markets and have required a strong sales and solutions focus.
Kevin Kyer	EVP - Search		Kyer has over 20 years' experience in digital commerce. Kyer was previously COO of Listgloabally, a global real estate advertising site, where he played an integral role in marketing its product to more than 50 countries. Kyer also spent 10 years at Yahoo, in which he played a significant role in building Yahoo's search platform, turning around its European division and devise a strategic partnership with Microsoft.
Ken Ruck	EVP - Personalised Ads		Ruck has worked at several start-ups as well as large media companies. Ruck has significant experience in Artificial Intelligence, digital media and video markets. Prior to LNU, Ruck was CIO for Kodak. Previous senior roles include Head of Wireless MTV, VP Global Digital Jim Henson, Global New Products for Turner and GM for Virgin Mobile. Ruck was one of the founding members of Oberon Media, Flash Networks, Hemisphere Interactive and cPulse.
Peter Cohen	EVP - Anti-Piracy		Cohen has expertise in multi-platform content production, programming and distribution. Cohen was previously the Head of Business Development for Experience Proximity, a leading Mobile AR / VR company based in Los Angeles. He also worked as a VP Sales & Marketing at HBO, Senior VP CNN International, Senior VP Programming at MTV / The Box Music Network, and Senior VP Mutch Music USA.
Tom Slowe	EVP - Security & Defence		Slowe has more than 20 years' experience in the disruptive Artificial Intelligence sector. Slowe has a strong technical background and is an expert in machine learning applied to big data and video. Slowe has held several senior executive roles, where he was in charge of providing products and services to Fortune 500 companies in Retail, Broadcasting, Advertising, Social, Department of Defence and the US Intelligence Community. Slowe holds a Bachelors of Science in Electrical Engineering from Rutgers University and Masters of Science from MIT Media Laboratory.

Source: Linus Technologies Ltd, Patersons Securities Ltd

## Recommendation History



**Stock recommendations:** Investment ratings are a function of Patersons expectation of total return (forecast price appreciation plus dividend yield) within the next 12 months. The investment ratings are Buy (expected total return of 10% or more), Hold (-10% to +10% total return) and Sell (> 10% negative total return). In addition we have a Speculative Buy rating covering higher risk stocks that may not be of investment grade due to low market capitalisation, high debt levels, or significant risks in the business model. Investment ratings are determined at the time of initiation of coverage, or a change in target price. At other times the expected total return may fall outside of these ranges because of price movements and/or volatility. Such interim deviations from specified ranges will be permitted but will become subject to review by Research Management. This Document is not to be passed on to any third party without our prior written consent.

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