

ANALYSIS

The rise and rise of the Asia Pacific virtual network operator

SINGAPORE

Using MMS to track down an escaped JI terrorist

MOBILE SHAKEOUT

Now Mitsubishi says it wants out of the mobile handset market

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Singapore opens selection process for national 100Mbps network operating company

Singapore's Infocomm Development Authority has launched the pre-qualification process for the operating company for its planned 100Mbps national broadband network.

The IDA has already shortlisted ten bidders for the passive network company—under a novel policy, the government's passive network owner selection process is separate to that of the operating company that operates the switches and transmission.

According to tender documents issued yesterday, the successful operating company would design, build and operate the active infrastructure for the network and provide it on an equal basis to retail service providers. Companies and consortium members who pre-qualified in the previous competitive dialogue process can bid as well as newcomers who can establish their credit worthiness and experience in funding, implementing or operating network projects worth at least \$S100m.

The proposed network would feature initial capacities of 100Mbps downstream and 50Mbps upstream with the ability to upgrade to 1Gbps throughout. Pricing must be competitive and bidders must outline how they will foster high adoption in residential, business and government markets.

Ten companies have pre-qualified for the separate netco tender, which calls for a passive network covering 95% of Singapore premises.

They are: Alcatel-Lucent Singapore, Axia NetMedia Corporation of Canada, BT Singapore, City Telecom Hong Kong, NTT West, Nokia Siemens Networks Singapore, Singapore Computer Systems Limited, Singapore Telecommunications Limited, Singapore Power Telecommunications and StarHub.

The IDA plans to hold a briefing for interested bidders on Thursday with a tight deadline for actual submissions falling on 17 March. A formal RFP process will be launched next quarter with the winner to be announced at the beginning of 2009.

Grahame Lynch

Singapore police leverages telco networks for terrorist manhunt

In a world first, the Singapore Police Force turned to the city's telecommunications networks over the weekend in a bid to track down Mas Selamat Bin Kastari, a leader of the Jemaah Islamiyah (JI) terrorist group who escaped custody while going to the toilet last Wednesday.

As part of the manhunt, the city's three mobile operators sent a MMS with the escapee's photos to the estimated 3.9 million mobile subscribers in the city.

"Subscribers of M1, Starhub and Singtel will receive the photograph of Mas Selamat via MMS free of charge," the Singapore Police Force said in an announcement Saturday. "A single message will be sent to subscribers of the three telcos from 12 noon, 1 March 2008. In view of the large number of



handphone users in Singapore, the whole process of reaching all the subscribers will take several hours.”

Users without MMS-enabled phones received an SMS with a link to a Web page with the same photo. SingTel also sent an email with the JI leader’s photograph and physical details to all their Singnet users.

Mas Selamat is accused by the government of having planned seven years ago to attack the US Embassy, the American Club and Singapore government buildings after Singapore arrested and detained several JI members. JI is blamed for a series of attacks in South East Asia that have killed more than 250 people since 2002. So far, the police confirmed that at least two calls were received from staff at a petrol station, but subsequent search of the area was not successful in recapturing the fugitive. In a strange twist, a 58 year old man was arrested by police on Friday after he made a hoax call the department claiming he was the escapee.

Tony Chan

Philippine telecom sector steady this year

The Philippines’ telecom industry is set for a steady and modest pace of growth this year with core mobile services “approaching maturity” in terms of addressable market, reported international credit rating firm Fitch Rating as quoted by local TV network GMA News.

According to the Fitch report, new growth engines will unlikely deliver significant contributions to the sector’s earnings as major operators are struggling with the slowing growth in traditional areas and mounting investment needs for new growth areas such as consumer broadband.

The country’s mobile phone penetration stood at 57% or 50 million subscribers as of 2007, while fixed line subscribers’ penetration rate remains stagnant at 18.6%, according Fitch’s estimates. The two monopolies in the local telecom market PLDT and Globe two are both set to invest in broadband services, with US\$550 million and US\$400 million of investment respectively for mobile services and wired and wireless broadband technologies.

Globe forecasted a less upbeat outlook for the domestic telecommunications industry in 2008 saying the strong peso, rising oil prices, and an economic slowdown in the US could weaken consumer spending. The strong peso could continue to hold back revenue growth from overseas calls, the firm said.

“The industry will continue to grow but the pace will depend on developments in the broader economy,” according to presentation materials released by the company recently.

The analyst also sees tougher competition among local phone companies.

“Competitive intensity will remain and may even heighten with new and/or re-emerging players,” it said. “Operating margins will continue to be under pressure.”

On a more optimistic outlook, Fitch said the addressable market for broadband services is expanding rapidly, fortified by rising personal computer penetration, which stood at 58% in 2006 or 1.4 million units presenting a penetration of 8% as broadband penetration rate was at 2%. In 2007, broadband penetration went up to 4%.

Pamela Perez

Mitsubishi Electric zaps mobile unit

Japanese electronics maker Mitsubishi Electric announced it is set to break-off its loss-making handset manufacturing unit and shift its efforts into other more resilient businesses.

Mitsubishi makes more than US\$965 million a year from its mobile unit, however, the firm has been unable to make profit amid cut-throat market competition, the Nikkei business daily reported.

Moreover, Japan’s mobile telephone market now provides very little room for growth as nation of 127 million people owning more than 100 million mobile phones as well as the shrinking population, said AFP.

“Consequently, Mitsubishi Electric’s mobile handset business has recently suffered shipment decreases and it has become extremely difficult to expect an improvement in this field,” a company statement said.

Mitsubishi’s expected US\$970 million mobile phone sales in the current fiscal year to March totaling 2.1 million handsets, mainly for leading Japanese carrier DoCoMo, will even be cancelled,

said Nikkei.

Mitsubishi Electric has about 600 employees in its mobile phone operations. The company said it was not planning any layoffs and instead would transfer its existing employees to more promising divisions such as automated factory equipment, auto parts and air conditioners, the Nikkei said.

The firm has decided on a different course of action as it will strategically shift resources to areas with brighter prospects, such as communication infrastructure, home and business security systems, and factory automation systems, AFP said.

According to the company's recent release, "This decision has been made with a view to further accelerate the company's growth strategy under the management policy of making strong businesses stronger."

Mitsubishi's move is the latest case of a Japanese firm realigning its operations, dropping or spinning off weak businesses to focus on areas of strength, which came only weeks after rival Sanyo Electric decided to sell its mobile handset production operations to rival Kyocera.

Among other recent restructuring, Toshiba exited high-definition DVD while Hitachi decided to withdraw from the personal computer business, according to the AFP report.

Pamela Perez

India's Unitech gets licenses

India's second largest realty firm Unitech has been granted 10 more telecom licenses by the Department of Telecommunications, Ministry of Communications & Information Technology, Government of India for its subsidiaries to provide Unified Access Services (UAS) licensing it to operate in all the 22 telecom circles across the country making them the pan-India telecom player.

The government issued 22 more telecom licenses to new players for the third straight day on Friday, taking the tally to 66 so far.

According to senior officials in the DoT, besides Unitech, Spice Communications has also been given licenses for three circles in Andhra Pradesh, Maharashtra and Haryana and would also get license for Delhi, adding that the government will be issuing 120 new licenses among nine firms who were given Letters of Intent on January 10.

On spectrum allocation, the officials remained non committal as a final decision is yet to be taken. In any case, they have to apply for the air waves first.

Meanwhile, a number of the new players are already in talks with equipment manufacturers to start setting up network in their respective circles so that services could be started as soon as the spectrum was allocated.

The company has recently sealed two real estate projects in Hyderabad that it would develop over the next eight years. It is also planning to launch an initial public offer of its office trust in Singapore, for which it has received the approval from the Singapore Exchange.

Pamela Perez

Wanna friend? Buy a mobile

Softbank Mobile announced a line of "robot" phones tied into a forthcoming Japanese television series. The handsets take on humanoid form via limb attachments while a display shows different facial expressions.

Lonely subscribers will also be able to interact with their wireless robot pals by answering preset phrases with yes or no responses. "We haven't decided on specifics yet on the communication between the user and mobile, but your mobile would grow into a buddy different from others that is unique in the world," spokesperson Katsuhide Furuya told reporters. Softbank plans to release the PhoneBraver handset in April after the launch of the "Cellphone Investigator 7" series



INDIA'S RURAL KIOSK PROJECT

India has unveiled an ambitious WAN and broadband kiosk project aimed at furthering communications access in rural markets. The proposal relies on local carriers to build out Rp \$188.6 million worth of statewide wireless area networks and establish some 100,000 public broadband access

points. The plan includes \$68.7 million for setting up state data centers via local players. "This is of direct benefit to the telecom sector," noted Frost & Sullivan analyst Sourabh Kaushal. "Looking at the potential this is miniscule but is definitely a move in the right direction."

LTE TO BEAT OUT WIMAX?

WiMAX could be in danger of losing its 4G lead to competing LTE technology, according to ABI Research. The analyst believes one of the standards will wind up dominating the 4G space while UMB will ultimately prove an also-ran. WiMAX presently has a time-to-market edge but is losing that advantage due to delays in certifications by the WiMAX Forum. The obvious LTE migration path for current GSM operators is also likely to give that technology the win. "The biggest opportunity for mobile WiMAX is the chance to develop a wider device ecosystem and worldwide subscriber base before LTE starts to do the same," said analyst Philip Solis.

OPTICAL SALES RISE 19%

Optical network gear sales rose 19% last year to \$13.9 billion, according to Infonetics Research. The performance is the fourth straight year of improved sales on the back of greater IP services deployment and precludes an estimated annual haul of \$15.4 billion within the next three years. WDM gear continues to swipe dollars from SONET deployments, with the segment rising 39% last year as WDM ROADMs revenues doubled. Asia Pacific accounted for a quarter of global sales, ranking third behind EMEA (36%) and North America (34%).

Analysis by Siow Meng Soh

Virtual Network Operators in Asia-Pacific seek growth through partnerships

Service providers that have adopted an asset light approach in offering enterprise services across Asia say they do not necessarily find themselves at a disadvantage when competing with network operators. From small and medium-sized enterprises to large multinational corporations (MNCs), customers have been evaluating virtual network operators (VNOs) and comparing them with traditional telcos that manage their own network infrastructure. The decision for choosing a VNO may not always be based on cost alone.

While companies are keen to save operating costs, they are also concerned that VNOs may not deliver the same kind of service levels as operators that have control over their own networks. In most countries, local incumbents are theoretically able to offer end-to-end solutions, ensure better customer support, and fix network problems more rapidly. However, this may not be true for

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For advertising details contact Sally Lloyd at sally@commsday.com.au or call +61-292615435

Editor, Australia: Luke Coleman

Luke@commsday.com.au

Editor, United States: Patrick Neighly

Pneighly@madyakpress.com

Editor, SE Asia: Geoff Long

geoff@commsday.com.au

Journalist: Pamela Perez

Pamela@commsdaymail.com

Correspondent, Singapore: Siow Meng Soh

siowmeng@hotmail.com

Correspondent, Kuala Lumpur: Cat Yong

catyong88@gmail.com

Correspondent, London: Martyn Warwick

martyn@telecomtv.com

For subscription details contact Laraine Davis at laraine@commsday.com.au

MNCs that need to establish connectivity with their offices located in different countries. It is known that even the largest global carriers need to deal with wholesale providers and domestic operators in different countries to provide local access.

VNOs such as Vanco and Virtela that are targeting MNCs have been announcing new contract wins. Vanco has recently announced new customers such as Premier Foods and Specsavers. The GBP 4.5 million, five-year Specsavers contract requires Vanco to design, implement and manage its wide area network globally, including several European countries and Australia.

Virtela has also clinched new deals including PennEngineering, a US-based specialty fastener manufacturer. PennEngineering has engaged Virtela to manage its virtual private network (VPN) in Asia which is to be linked to its network in other continents. Apart from meeting PennEngineering's coverage requirement in the Asia-Pacific region, Virtela is also able to provide features such as the automated network management tool and accelerated WAN that are offered by other tier-1 operators.

Even though VNOs are known to offer cost-effective solutions, increasingly, these operators are enhancing their services to convince customers their ability to offer better quality of service. A key task for a VNO to grow its business and to improve its services is to expand the number of partners including network operators, resellers and system integrators.

Macquarie Telecom, a hybrid VNO, has been focusing on developing new strategic partnerships and the company announced its MPLS interconnection agreement with CPCNet in January 2008. The partnership with CPCNet allows Macquarie Telecom to expand its network reach (particularly in Greater China) and leverage CPCNet's presence and knowledge of the Chinese market to provide better customer support. Virtela, which is also a hybrid VNO, has recently reported revenue growth of 25% in 2007. In particular, the company has achieved strong growth of nearly 40% in the Asia-Pacific region through channel partners.

Besides revenue and network coverage, there are other benefits of building partnerships and leasing carriers' networks. Working with multiple carriers allows VNOs to improve their network resiliency since they are able to re-direct traffic to another carrier's network if the current network is having an outage. In addition, VNOs are able to deliver customised solutions to meet specific needs of enterprise customers by selecting the optimal solutions from the right partners. Moreover, VNOs do not have to bear the risks of investing in costly network infrastructure or hiring large number of engineers to maintain the networks.

LESS ASIA PAC COMPETITION: An advantage for VNOs is that there are not many such players operating across the Asia-Pacific region and existing players are able to find their own sweet spot. Larry Morgan, Managing Director of Macquarie Telecom, told Communications Day that target customers for Macquarie Telecom would be mid-sized enterprises of up to 1,000 employees in the Asia-Pacific region. The company, which started its operations in Australia, is now focusing on serving customers in eight other Asian countries including Singapore, Hong Kong, Australia, New Zealand, Indonesia, Malaysia, Vietnam, China and India.



While Vanco is competing with a few global operators for large multinational customers, it is targeting "multi-domestic" customers. These are companies that have many sites in several countries (e.g., companies in retail, hotel and manufacturing segments). Vanco's Asia-Pacific CEO, Diarmid Massey told Communications Day that the company would be focusing its sales efforts in key markets such as Japan, Singapore and Australia where there are high concentration of multi-domestic companies. Vanco has also identified more than 1,200 companies in the Asia-Pacific region as prospects.

Pacific Internet was also operating on a VNO model before it was acquired and merged with Asia Netcom. Pacific Internet was successful in targeting small and medium-sized enterprises in the Asia-Pacific region. However, after the merger, Pacnet now targets a wider range of customers and it operates a regional backbone network – EAC-C2C.

VNOs in the Asia-Pacific region should do well and they are growing their business with new partners and new solutions. Nevertheless, it is crucial for VNOs to continue addressing issues related to meeting high quality of service. These operators need to maintain good relationship with customers and partners to enhance credibility.

> Macquarie shaves 6% off power bill by going green

> CO2 used to cool data centre environments

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More information can be found at <http://www.greentelecomlive.com>

Telecoms in the age of US\$100 oil

Anyone taking a flight in the past year would know that rising oil prices can directly impact the price of services. While ticket prices charged for the flight to the destination, most airlines now impose a separate fuel tax on each passenger in order to pass on the extra costs.

In the past year alone, the price of oil has risen some 50%, culminating at a historic high of US\$102.08/barrel on Tuesday. Meanwhile, the price of coal has experienced more or less the same trend, spurred by a general rise in demand from fast growing economies such as China and India, and impacted specifically by recent events such as the severe snow storms that wreck havoc on South China early this year. The price of thermal coal at Australia's Newcastle port, an Asian price benchmark, closed at US\$125 per metric ton in the week of February 11, up some 34% in less than a month and 143% year-over-year.

The situation is only going to get worse, according to most energy experts. The price of oil is predicted to go as high as US\$200/barrel in the next 12-18 months, while coal is expected to double in the next year.

As a major consumer of energy to run networks and services, the telecoms industry is already feeling the effects of surging prices. Sources at one Asian operator revealed that power expenditure rose some 30% in the last fiscal year, pushing up the basic SG&A and impacting margins for some services.

"Electricity prices are linked to gas and oil prices. Both have increased substantially over the last few months," says Allan Deacon, a member of British Telecom Group's Procurement team. "In the UK approx 80% of the cost of electricity we pay is market related. This % varies slightly in each country but is always the significant factor."

According to Deacon, energy is an important cost consideration for BT, but it isn't one of the company's biggest costs. "Our prices are not as sensitive as, say, an airline."

EATING ENERGY: Yet, telecoms networks do eat up a lot of electricity. NTT DoCoMo, for example, used 2,531 GWh of electricity last year, of which 2,279 GWh, or around 90% of the total, was spent running telecommunications facilities. Similarly, British Telecom spent 2,619 GWh on power last year, with 1,992 GWh going to run its networks. At one international operator, the annual energy bill from a handful of cable landing facilities is around US\$2 million.

"We expect any increase in power prices to cause a rise in our basic costs given that we are a major power consumer in New Zealand (required to operate our network)," says Steve Kerr, environmental manager for Telecom New Zealand.

At the same time, these costs are now being passed down to purchasers of telecoms services.

"We have already seen price increases from our suppliers in terms of co-location facility provision and we expect to see similar increases in other areas over the next 12-18 months," adds Ian Mackie, regional marketing manager for Vanco Asia Pacific, a virtual network operator that purchases bandwidth on third-party networks to connect its customers.

Any effect resulting from higher energy costs will be more acute in the data centre environment.

"There is little doubt that rising energy prices will force the IT and telecoms industries to review their data centre operations. We would also add incoming carbon imposts (Kyoto etc.) as a contributor to the increase in electricity prices on top of the increase in fuel prices and the associated investment in transmission and generation infrastructure," states Malcolm Roe, group manager, business development for Leighton's Metronode. "Our energy forecasts show power prices increasing by significant amounts (20%+ year on year) and at the same time total power required in data centres continues to increase (up to four or five times over the last 5 years)."

In some cases, fuel price fluctuations are passed down to customers. For example, most data centre operators today separate facility and energy prices so the risk of energy hikes really falls on their customers. On the other hand, there is a big energy component to the operations of the facility itself.

“For a typical Australian data centre user today (1,000m² at 1,000W/m²) power charges represent almost 30% of their total data centre facility operating costs (facilities only excluding IT infrastructure but includes cooling and building services),” Roe says. “A doubling in today’s power price will increase that proportion to almost 45%. Doubled again and power will become the major portion (60%) of the facility’s operating cost.”

FORWARD BUYING: For the most part, the respondents to Green Telecom’s research point to existing mechanisms that offer some type of protection against massive increases.

“We purchase a considerable part of our power from the spot market,” explains Kerr from TNZ.

“Telecom works hard to mitigate the impact of such cost increases through its long term strategy of a low cost operating model. However, again the operation of the spot market in New Zealand is the key factor in the extent and nature of power price increases.”

A similar mechanism exists in the UK, where BT’s suppliers allow forward buying of electricity when market prices are favourable, says BT’s Deacon, adding that fixed electricity contracts remain unattractive due to higher mark ups. “Most ‘green’ energy is sold at a premium to the market prices. Any fixed price contract tends to be set at a high level to protect the supplier from price hikes. The flexible model we employ usually works better over the long term than the fixed price model, but many organisations lack the skill and resource set to do this.”

Yet, there are fuel-intensive activities that will impact a carrier’s bottom line, such as marine maintenance, which consists of cable ships out on the open sea for weeks at a time to repair damage subsea cables. Marine fuel is derived from oil and any price hike in that area will likely be passed on to the operators themselves. In fact, fuel is such an important part of the service that daily reports from the ships during any operation will consist of a separate item for the costs of fuel. The owner of the cable must absorb any volatility in fuel price as there is nothing like the airline’s “fuel tax” for telecommunications operator.

At the same time, mobile operators with sites in remote locations powered by diesel generators will now have to pay higher gasoline prices to get the fuel to the sites. Essentially, any activity that requires moving things from one place to another will be impacted.

CO-GENERATION OPTION: For Metronode, the solution is to build its own generating facility along with traditional electricity providers – or a process called co-generation.

“Co-generation will provide energy savings and has the potential for providing energy pricing certainty (our initial studies show that electricity pricing (cents per kWh) could be fixed for a period of time rather the scenario of year on year increasing electricity prices),” Roe says. “Co-generation is a thermodynamically efficient use of fuel. In the normal production of electricity around half is wasted as excess heat but with high efficiency generators matched with absorption chillers this energy is utilised for cooling the data centre. This means that less fuel needs to be consumed to produce the same amount of useful energy.”

Further benefits from co-generation include a reduction in carbon emissions, which in turn can translate into carbon credits in markets that have an established carbon trading market.

MARKET OPPORTUNITY: It’s not all bad news. As the pitch comes down from rising fuel prices, it represents opportunities for service providers to offer more efficient solutions.

“In line with this we will expect to see more and more global enterprises who are currently managing multiple providers in different regions re-assessing their network management costs and looking at outsourcing, unifying their communications with integrated solutions, network consolidation and more detailed audits of their existing infrastructure assets and expenditure,” Vanco’s Mackie says.” All of these elements are areas where Vanco, as an independent third party, can provide useful council and with our unparalleled access to the equipment providers around the world energy reduction and compressions technologies will be growth areas for us when installing global networks.”

Metronode’s Roe adds: “One of the market outcomes Metronode is already seeing is the consolidation of many small less reliable, capital and energy inefficient facilities, into a smaller number of large purpose-built facilities.”

Macquarie Telecom shaves 6% off power bill in 2 months

By looking closely at the power consumption of its data centres and identifying measures to better manage energy use, Macquarie Telecom has achieved measurable results following the implementation of green initiatives in its facilities.

“We’ve been looking at how our operations are performed and how we can improve them from an energy efficiency perspective – our key focus has been on understanding where the power is going and why,” says Aidan Tudehope, managing director, Hosting, Macquarie Telecom. “Based on the results of our measurement, we essentially created a list of things we’d change and improve in the data centre and have gone about gradually making these changes. Each change is monitored so we can assess the impact, and those that are effective in improving energy efficiency or reducing energy consumption have been adopted as best practice.”

According to Tudehope, simple measures that require very little extra investment have already started to yield results.

“In just two months, we’ve managed to reduce our power consumption bill by six per cent in the Intellicentre. This was through simple actions related to how we manage cooling of the data centre in particular. Simple steps like making sure there were no open floor tiles in the data centre allowing cool air to be pumped into areas that didn’t need to be cooled take effect very quickly.”

COSTS OF METERING: While saving energy saves money, going green doesn’t come without some initial costs, especially with existing facilities such as Macquarie’s Intellicentre in Sydney.

“There was definitely a cost incurred on our behalf in this process – a mixture of labour costs and equipment costs when you break it down,” Tudehope said. “The process of setting up the metering and measuring points across the Intellicentre was a cost for example. When we built the data centre six years ago there was no apparent need to meter so installing hundreds of these measurement points across the Intellicentre now has had a cost attached.”

Tudehope added however, that many of the actions taken to actually reduce energy consumption were free. “It’s been about smarter practices and better approaches taken in response to the findings.”

COMPETITIVE EDGE: The good news is that customers in Australia are increasingly looking at green solutions and partners who can help them through the greening of the corporate infrastructure.

“As a rule, green our own data centre is becoming more and more of a competitive advantage in the market,” Tudehope said. “As customers increasingly seek out technology partners that share the same CSR and environmental goals as themselves we are seeing this as a key driver in the purchase decision process for some customers.”

In Australia, the market remains a “mixed bag,” with large corporations and government departments now putting emphasis on green credentials in tender documents while mainstream businesses showing desire but less commitment.

SUN CHOICE: Following the initial steps to optimise its facility, Macquarie is now planning to tackle energy consumption of the core infrastructure of servers, switches, firewalls and air conditioning, which now make up over 85% of the total cost of operation. In December, Macquarie announced the selection of Sun Microsystems as its preferred data centre supplier.

“Sun Microsystems has made an investment in building ‘green servers’ that are smarter in their use of energy and have less impact on the environment. Idle processors consume power; and between the hours of 1am - 6am most corporate server processors are idle. Sun Microsystems has taken this insight and, in response, developed servers that use less power when processors are actually idle, for example, its Sun x64 servers,” Tudehope continued.

“This move is expected initially to improve efficiency of the data centre energy consumption by more than 650,000 KW per year. This equates to over 600 tonnes of CO2 emissions, according to Energy Australia calculations so we’re on the path to greater improvements in future.”

GETTING THE MOST OUT OF GREEN PRODUCTS: Many vendors have issued claims of ‘green’ products, but it is not always easy to achieve those promised benefits. Macquarie has developed a three-step process starting with developing an understanding of the power metrics of the facilities, working with vendors to ensure that equipment matches requirements and is deployed under the ideal

Visit the EXTRA section of www.greentelecomlive.com to read the full transcript of our exclusive interview with **Aidan Tudehope**, managing director, Hosting, Macquarie Telecom.

conditions, and finally, maintain monitoring and measurement of the equipment once they are deployed.

Liquid CO2 for high density cooling from Trox AITCS

The compound that makes the bubbles in Coca Cola is now being deployed to cool high density data centre environments.

As Green Telecom reported earlier, Trox AITCS, a company founded by Trox TECHNIK, a world leader in industrial and commercial cooling systems, is bringing to Asia its high capacity cooling solution using liquid CO2. The company announced a major expansion into Asia, with a brand new office in Hong Kong's Lippo Centre, and plans to significantly expand headcount across the region.

The company is targeting corporations and any organization with high density cooling requirements such as data centres and even dealing floors of major banks.

"The issue of increasing heat loads from electronic equipment is found across different industries," said David Leatherbarrow, managing director of Trox AITCS and the brains behind the idea. "There are lots of people with major problems in cooling electronic equipment that they can't deal with."

According to Leatherbarrow, the heat removing capacity of liquid CO2 and the company's product design, which places the cooling system on the racks themselves instead of the environment of the room, offers unique advantages over conventional air and water-based cooling systems.

Liquid CO2 offers 7.2 times the cooling capacity of water, which allows the Trox system to be smaller and support higher densities, all the while being more energy efficient. "Our system compared to water systems and water and air systems, it's about a third less energy, and it takes up less space and has 50% more capacity than other alternatives that are available," he said.

Despite its breakthrough performance claims, the patented system is based on a simple concept.

"When you boil water, basically you take the heat and it turns it into a gas. What we do is we circulate CO2 on the same basis that we would circulate water," Leatherbarrow said. "When it boils, it takes away heat from the computer. You supply all liquid and you end up discharging a mixture of gas and liquid but still at the same temperature and pressure because if you take the temperature from the steam from the kettle and the temperature of the water, it's the same temperature, and it's the same pressure."

One major challenge for the deployment of liquid CO2 is that "in high concentrations, it stops you breathing," Leatherbarrow continued. To rectify this issue, Trox has adopted tight control over the installation and deliver process. "The type of people who are installing it on our behalf are either from the refrigeration industry, or from the petro chemical industry, so they are normally used to working at the higher level of integrity and we intend to carry on that way. We also do not allow anybody to do installation. The total turnkey contract must be with TROX aitcs, and we approve and select, and the installers work for us. What the clients get is a fully installed system"

Read the full interview with
David Leatherbarrow
from Trox AITCS on the history, development and technical details of liquid CO2 cooling systems in the Extra section of
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