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 Report Title: Preliminary Assessment of Wireless Communications Technology for Michigan Voting Systems

Executive Summary

Two versions of Michigan voting systems both Dominion and ESS have been found to have utilized wireless technology. The Dominion Voting Systems proposal for Antrim County shows a quote for wireless transmission capabilities, see Figure 1. Dominion representatives also confirmed issues with wireless transmission of vote totals and even went as far as disabling the saving of ballot images without explicit authorization.

The ESS Model DS200 was found to have an internal wireless card, that has a private network address that was designed to communicate with an ES&S Primary Host Server. These devices and servers are ostensibly designed to operate on a virtual private network (VPN) that does not allow routing to the Internet. While each of the devices do have private network Internet Protocol (IP) addresses, testing revealed that the SIM card used for the DS200 could be utilized in a generic device 4G wireless device and allow for access to the same access point name (APN). There is substantial risk to the ES&S APN connected machines from malicious actors that have access to any SIM card with pre-programmed access to the APN.

The manufacturer of the wireless 4G card used in the ES&S DS200 is a company named Telit. Telit is an internet of things company that has recently taken major investment from a Chinese investment fund that has ties to the Chinese Communist Party according to UK media reporting.

Antrim County Proposal for Wireless Results Transmission

PROPOSAL		DOMINION VOTING	
ANTRIM			
Total Registered Voters:	19,916	Date:	April 17, 2017
Base System Components - State Funded (Years 1-5)			
DESCRIPTION	QTY	UNIT PRICE	STATE FUNDED NET PRICE EXTENSION
Precinct Hardware (Shared Cost, State-Local)			
ICP Tabulator w/ Ballot Box	17	\$5,295	\$4,337.66 \$957.34 \$16,275
ICX-BMD-A Accessible Ballot Marking Device <i>(Includes Touchscreen terminal and printer)</i>	16	\$3,515	\$2,879.49 \$635.51 \$10,168
Sub-Total:			\$26,443
Election Management System Software (Shared Cost, State-Local)			
Accumulation Only EMS	1	\$18,563	\$15,206.81 \$3,356.19 \$3,356
Sub-Total:			\$3,356
Total Initial Purchase Price			\$29,799
Discounts			
Trade-in discount (Units must be brought to a central location for pickup)			Included
System Discount - Price Match			(\$29,799)
Sub-Total:			(\$29,799)
Total Initial Purchase Price (Shared Cost, State-Local)			\$0
Base System Extended Service and Maintenance for Years 6-10			
Extended Service and Maintenance			
ICP Tabulator w/ Ballot Box Annual Fee	17	\$375	\$6,375
ICX Accessible Ballot Marking Device Annual Fee	16	\$240	\$3,840
Accumulation Only EMS Annual Fee	1	\$2,500	\$2,500
Sub-Total:			\$12,715
Years 6-10 Base System Annual Fees:			\$12,715
Authorizing Signature, Title		Date	
Confidential - Not for Redistribution		1 of 2	

Optional Hardware and Software Components			
DESCRIPTION	QTY	UNIT PRICE	EXTENSION
Precinct Hardware			
ICP Tabulator w/ Ballot Box	1	\$5,390	\$5,390
ICP Tabulator (spare w/o ballot box)	0	\$4,395	\$0
Discount if purchased with this order			(\$57)
Sub-Total:			\$5,333
Election Management System Hardware			
EMS Express Server - Desktop	1	\$1,750	\$1,750
Compact Flash Reader/Writer	1	\$60	\$60
iButton Programmer with USB Adapter	1	\$50	\$50
ICX Activation Card Programmer	1	\$26	\$26
Sub-Total:			\$1,886
Results Transmission (Base - Wireless)			
ImageCast Listener Express Server - Desktop	1	\$2,200	\$2,200
ImageCast Listener Express Firewall	1	\$450	\$450
EMS Express Managed Switch	1	\$200	\$200
ICP External Wireless Modem	17	\$295	\$5,015
ImageCast Communications Manager Software	1	\$10,800	\$10,800
Sub-Total:			\$18,695
Results Transmission (Analog)			
ImageCast Listener Express RAS System	1	\$2,165	\$2,165
ImageCast Listener USB Modems (Receiving)	5	\$225	\$1,125
Sub-Total:			\$3,290
Results Transmission (VPN/SFTP)			
Compact Flash Reader/Writer (per municipality)	1	\$60	\$60
Note: Results Transfer Manager software is included for municipalities that wish to use VPN/SFTP method for transmitting results from memory cards to the county.			
Optional Hardware and Software Components Annual Maintenance			
Extended Service and Maintenance			
ImageCast Communications Manager Annual Fee	1	\$1,200	\$1,200
Authorizing Signature, Title		Date	
Confidential - Not for Redistribution		2 of 2	

Figure 1

Dominion Voting Systems ICX

In Michigan, the Dominion Voting Systems ICX is used to allow for touchscreen voting for disabled voters. During the forensics examination of an ICX machine there were two IP addresses discovered in unallocated space on the hard drive of the Linux operating system. The existence of these IPs in unallocated space implies the ICX had previous communication with one or both of the IPs.

The first IP address was: 120.125.201.101. This IP address is registered to Ministry of Education Computer Center located in Taipei, Taiwan.

The second IP address was: 62.146.7.95. This IP address is registered to EDV-BV GmbH QSC Subkunde located in Nurenberg, Germany.

The ICX machine itself appears to be manufactured in Taiwan and shipped to the United States via airfreight using China Airlines. See the photos of the shipping box in Figure 2.



Figure 2

The ICX machine may also utilize an external wireless for communications modem with the central listener server for Dominion Democracy Suite. See the previously listed proposal from Dominion to Antrim County. The manual for the ICX also shows an Ethernet port for wired connectivity, see Figure 3.

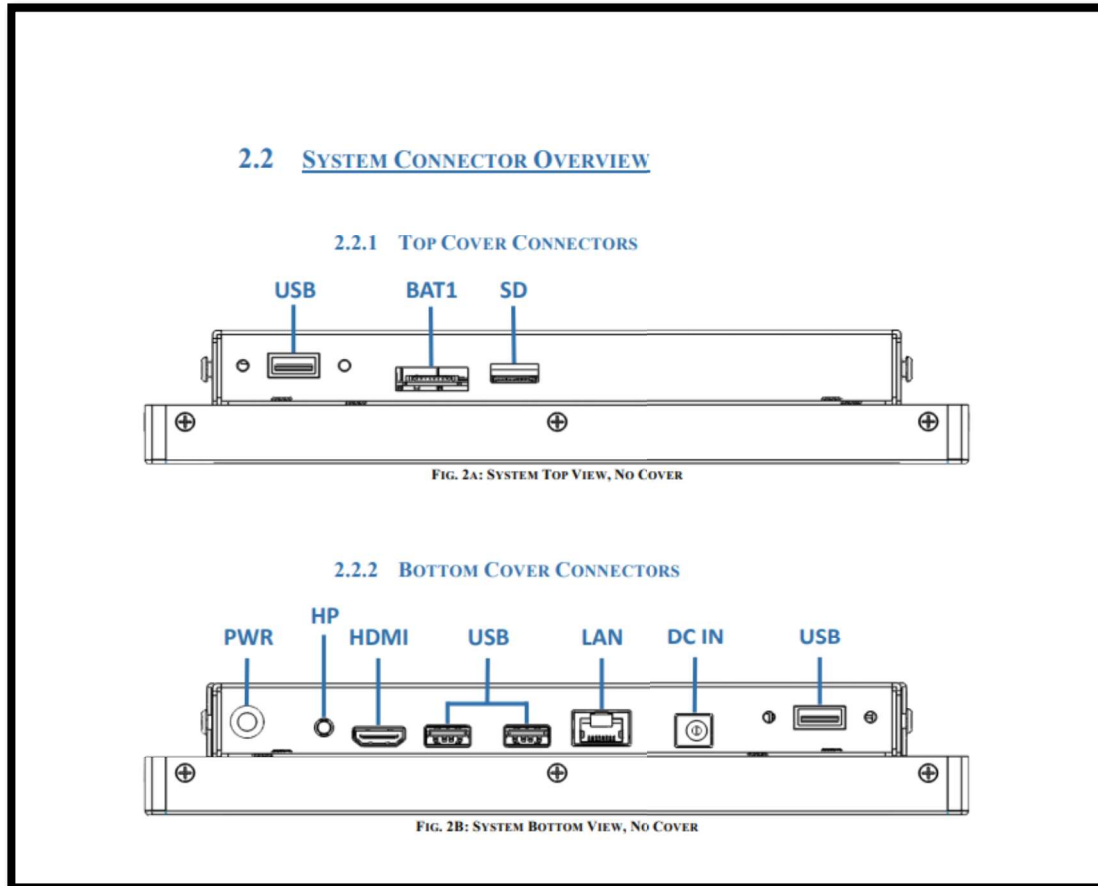


Figure 3

Dominion Summary Email to Michigan Counties

Dominion sent a summary email dated August 25, 2020 (Figure 4) after the primaries describing how the process of running the election went. Notably in this summary email from Cheryl Homes of Dominion Voting Systems she describes the following issues related to the transmission of vote totals via modems. In addition, Dominion turned off image saving without any authorization from the Secretary of State noted in the communication.

“Modem transmission this election were (sic) terrible in some areas! Failures and timing out due to the weaker 3G signal and cellular network issues meant that some of your precincts weren't able to transmit but instead brought the cards in to tally. We turned off image saving which will improve the transmission by a few seconds. We are testing the maximum time out setting for receipt of the transmission on the servers to

see if that will improve the success rate. We will also be doing some testing In the county to see if there are any ways to improve the process.”

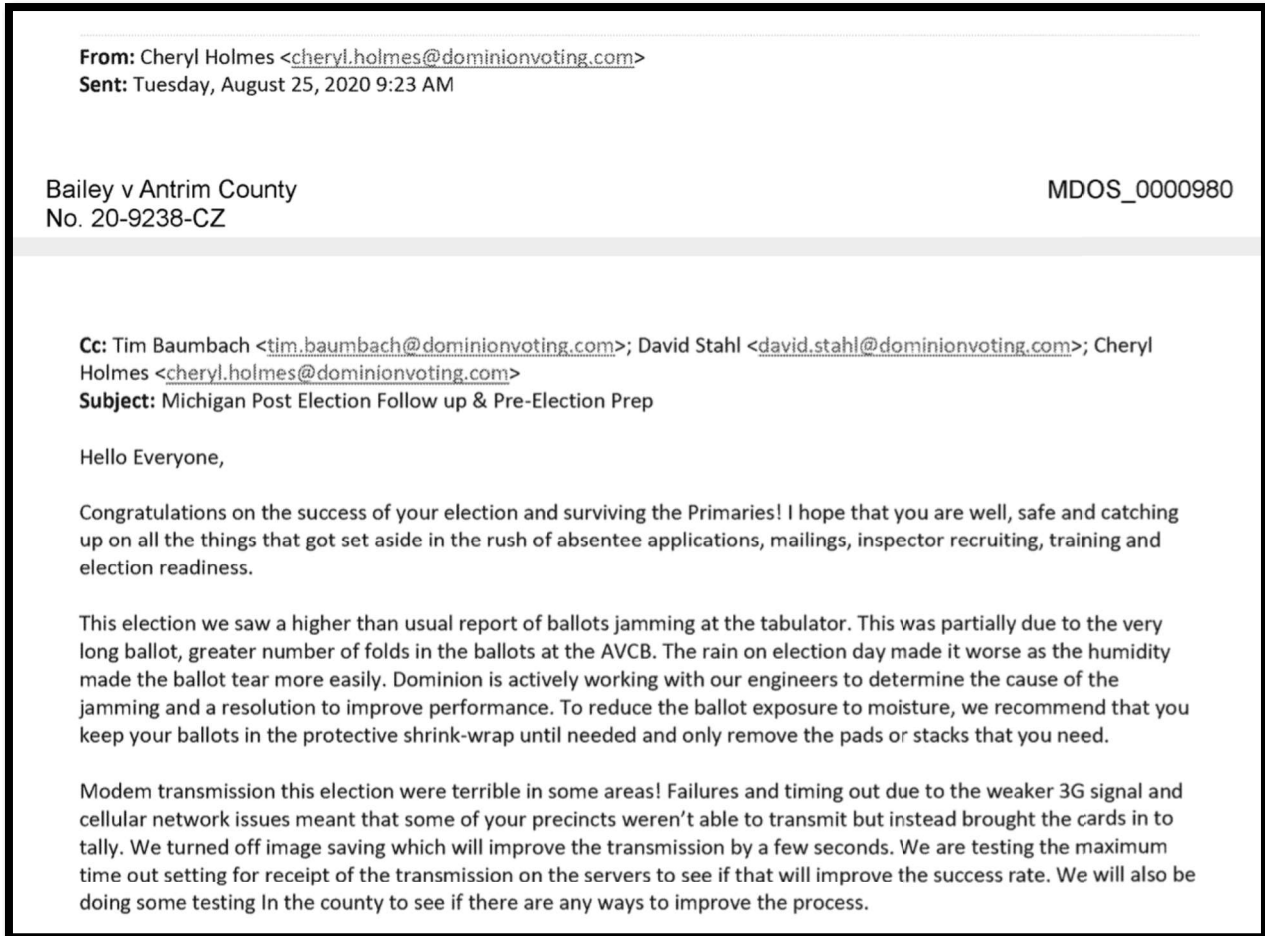


Figure 4

ESS DS200 Machine

The DS200 machine was found to have a wireless 4G modem installed internally within the enclosure of the machine. The printed tapes that summarize the activity during the election show that the 4G modem was used to send the results to a central listener server via secure file transfer. The Telit LE910-SV1 in Figure 5 was found within the ES&S enclosure.



Figure 5

The printed summary tape from the ES&S machines also indicate that the submission of the vote totals occurred using the wireless 4G modem, see Figure 6.

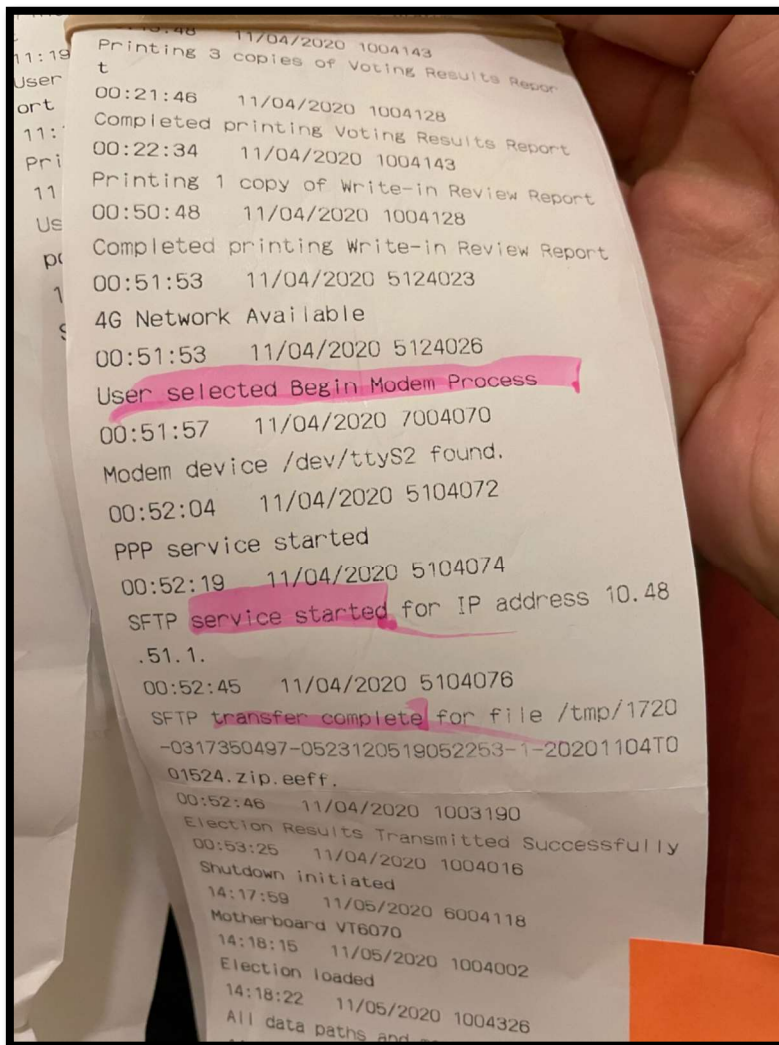



Figure 6

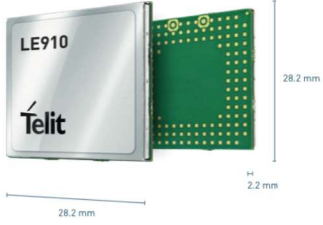
The Telit LE910-SV1 card installed in the ES&S device was utilizing a commercial Verizon SIM card with an APN configuration specific to the ES&S DS200 provisioning. Testing revealed that the same SIM card could be utilized in a separate wireless hotspot device and the device could then join the same APN as the ES&S voting machines. An unauthorized user could gain access to this APN by an extra SIM card pre-provisioned for this APN, or by removing a SIM from an operational device and using it in another device.

Telit LE910-SV1 Hardware Summary

According to the hardware summary specifications datasheet from Telit, the LE910-SV1 comes standard with "Internet friendly integrated TCP/IP and UDP/IP stacks, as well as HTTP, SMTP,

FTP, SSL.” (Figure 7) These features are very useful to application programmers, but are also ripe for abuse by unauthorized users of the APN devoted to the ES&S machines.





28.2 mm

28.2 mm

H 2.2 mm

LE910 Cat.1 Series

LTE Cat.1 10/5 Embedded

Product Description

The LE910 series of Cat. 1 modules are optimized for LTE low category networks and are available in single mode and 3G/2G fallback options. In addition to VoLTE support, the LE910Cat.1 series are swappable with other modules in the xE910 family.

Key Benefits

- Easy to integrate with peripherals and actuators using USB 2.0 HS, UART and user definable GPIOs
- Ideal platform for IoT applications and mobile data and computing devices with ultra-compact design and extended operating temperature range
- Internet friendly with integrated TCP/IP and UDP/IP stacks, as well as HTTP, SMTP, FTP, SSL
- Simple drop-in migration and technology design reuse path to 2G and 3G with any xE910 module
- Over-the-Air firmware update

Family Concept

These LTE low category variants are members of Telit's flagship xE910 module family delivering 4G radio access technology in the 28.2 x 28.2 x 2.2 mm family form factor. The Telit xE910 Unified Form Factor Family is comprised of 2G, 3G, and 4G, 3GPP and 3GPP2 products sharing a common form factor as well as electrical and programing interfaces which allows developers to implement a "design once, use anywhere" strategy.

IoT Connectivity Ready

This product is capable of supporting the extensive suite of Value Added Services from IoT Connectivity including Module Management and others which make the management of IoT deployments under mobile networks effective, enhancing profitability and reliability. It is also Portal-ready which means that the AT command library in this module includes a set of high-level commands designed exclusively for quick and hassle-free on-boarding of the device to the portal and to back-end systems and servers. Telit Portal-ready modules powered by deviceWISE make application-level data flows and controls simple to program, maintain and improve.

Variants

Different series of variants are available to fulfill the requirements of North America [AT&T, T-Mobile, Verizon, Rogers, Telus], Japanese and European market. Multiband configurations, covering different sets of 4G bands as well as MNO certifications, are available.

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IoT MODULES



IoT CONNECTIVITY



IoT PLATFORMS



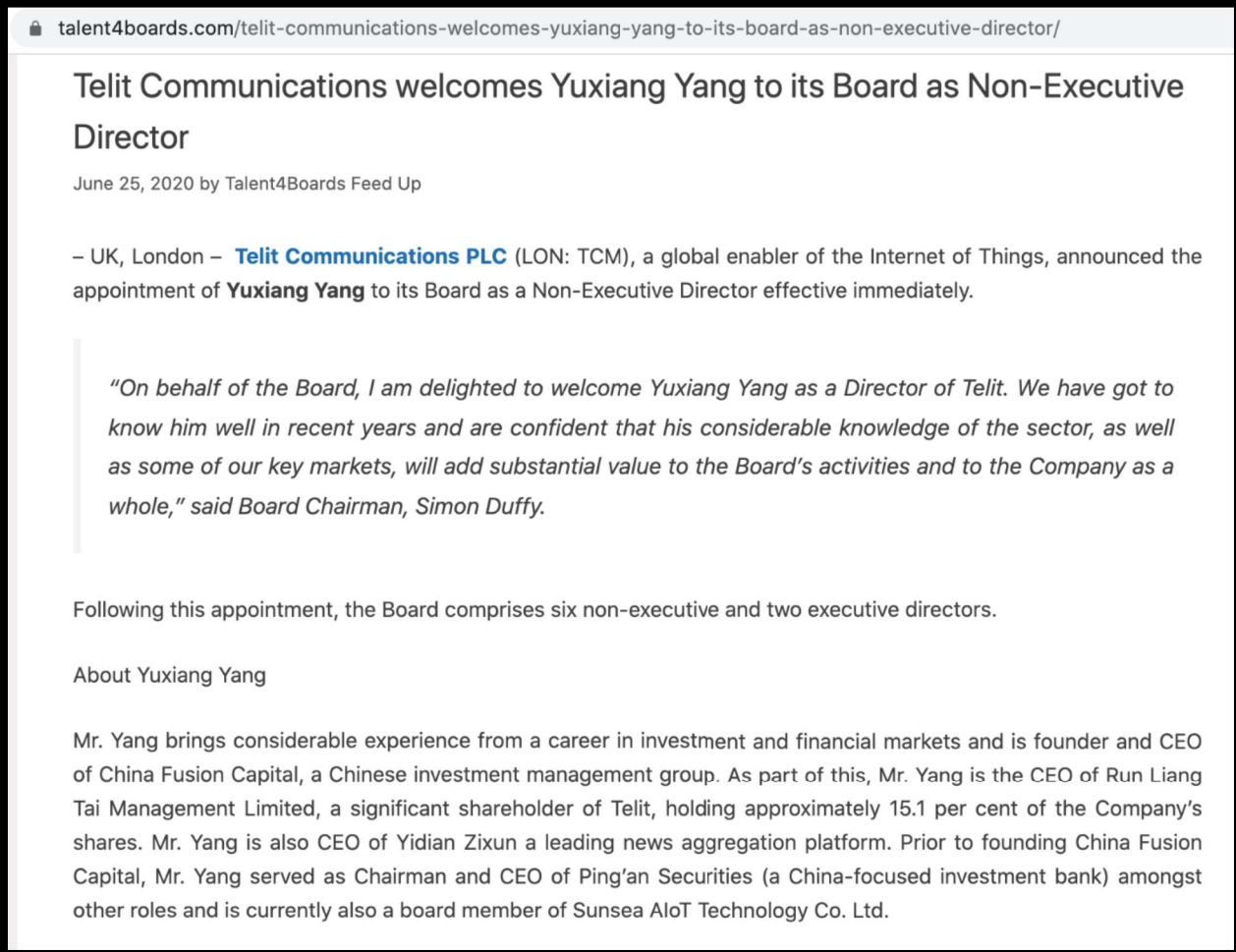
IoT KNOW-HOW

ENABLING END-TO-END IOT SOLUTIONS

Figure 7

Background on Telit

Telit is a publicly traded company Internet of Things (IoT) and Machine to Machine (M2M) company headquartered in London, UK with an operations unit in Trieste, Italy. In late 2017, Run Liang Tai Management in Hong Kong built a 14 percent stake in Telit. Mr. Yuxiang Yang sits on the board of directors for Telit (see Figure 8) and is CEO of Run Liang Tai Management Limited.



The screenshot shows a news article from Talent4Boards.com. The URL in the browser bar is talent4boards.com/telit-communications-welcomes-yuxiang-yang-to-its-board-as-non-executive-director/. The article title is "Telit Communications welcomes Yuxiang Yang to its Board as Non-Executive Director". The byline is "June 25, 2020 by Talent4Boards Feed Up". The main text states: "– UK, London – **Telit Communications PLC** (LON: TCM), a global enabler of the Internet of Things, announced the appointment of **Yuxiang Yang** to its Board as a Non-Executive Director effective immediately." A quote from Board Chairman Simon Duffy follows: "On behalf of the Board, I am delighted to welcome Yuxiang Yang as a Director of Telit. We have got to know him well in recent years and are confident that his considerable knowledge of the sector, as well as some of our key markets, will add substantial value to the Board's activities and to the Company as a whole," said Board Chairman, Simon Duffy. Below the quote, it says: "Following this appointment, the Board comprises six non-executive and two executive directors." There is a section titled "About Yuxiang Yang" which describes his background: "Mr. Yang brings considerable experience from a career in investment and financial markets and is founder and CEO of China Fusion Capital, a Chinese investment management group. As part of this, Mr. Yang is the CEO of Run Liang Tai Management Limited, a significant shareholder of Telit, holding approximately 15.1 per cent of the Company's shares. Mr. Yang is also CEO of Yidian Zixun a leading news aggregation platform. Prior to founding China Fusion Capital, Mr. Yang served as Chairman and CEO of Ping'an Securities (a China-focused investment bank) amongst other roles and is currently also a board member of Sunsea AIoT Technology Co. Ltd."

Figure 8

A media report from August 15, 2020 from the UK online publication *Financial Mail on Sunday* indicated that there were concerns raised about Chinese influence of the Telit firm within the UK government. Here is an excerpt from the news story located here: <https://www.thisismoney.co.uk/money/markets/article-8630685/Chinese-close-UK-internet-things-pioneer.html>

...The maneuvering by powerful investors comes after secretive Chinese multi-millionaire banker Yuxiang Yang joined Telit's board earlier this summer.

His appointment may raise concern in Westminster that a Chinese businessman with ties to his country's Communist government could be seeking to gain influence over the business.

Yang runs China Fusion Capital, the parent company of Run Liang Tai Management, a mysterious investment fund that has built a 15 per cent stake in Telit to become its largest shareholder.

Sources said some of the firms that have invested in Run Liang are giant Chinese companies, such as coal mining group Wintime Energy and Jiangsu Shuangliang, a manufacturer of air conditioners and boilers.

Run Liang also owns a stake in Sunsea Telecommunications, a Shenzhen-listed 'internet of things' provider that recently raised around \$200million (£1.5million) by issuing shares to Zhjzgroup, a state-backed tourism firm. Yang also sits on the board of Sunsea. Speculation has been mounting that Run Liang is hoping to engineer a merger of some or all of Telit with China-based Sunsea.

Run Liang's move on Telit, which is listed on AIM, follows a period in which several other London-listed businesses have been bought by China-linked firms.

Imagination Technologies was bought by Canyon Bridge – a private equity fund bankrolled by Beijing – in 2017 for £550million. Concerns rose in the spring when Canyon Bridge tried to place four directors from China Reform Holdings on to Imagination's board.

Conservative MPs Tom Tugendhat, who now leads the China Research Group, and David Davis warned that Imagination's intellectual property could be shifted to China.

When asked about Telit, Bob Seely, chairman of the Foreign Affairs Select Committee, said: 'We do need a thorough review of investment security and we need an oversight board for purchases by high-risk vendors or from higher risk states.' Telit, which is due to unveil figures next week, declined to comment.