CMB International Securities | Equity Research | Sector Update

China Hardware – Optical Transceiver

Implications from recent 4Q21 results

OUTPERFORM (Maintain)

China Technology Sector

Lily Yang, Ph.D
(852) 3916 3716
lilyyang@cmbi.com.hk

Alex Ng
(852) 3900 0881
alexng@cmbi.com.hk

Lana Lin
(852) 3761 8912
lanalin@cmbi.com.hk

During the past month, global Cloud companies have announced CY4Q21 results, and deliver good growth in their cloud business and gave positive guidance for the future Capex. Amazon/Google/Microsoft cloud segment grew 40%/45%/25% YoY. Continuous spending in infrastructure and equipment is essential to drive future growth. We hold a positive outlook for China optical transceiver sector given optimistic cloud spending. As many companies are digitalizing, they need a distributed computing fabric to build, manage, secure, and deploy applications. Such demand will drive the growth of data centers and then the optical transceiver sales.

- **Global optical components and modules market has reached US$8.7bn in 2021.** Currently, 100G still dominates but hyperscale CSPs are ramping the deployment of 200G/400G optical modules. Google is already testing 800G solutions. Chinese Internet Content Providers (ICPs) has started to upgrade their data centers with 200G and 400G optics from 25G and 100G optics, however, we saw demand from domestic Cloud companies become soft under new regulations.
- **Implications for cloud infrastructure from recent 4Q21 results.** In 4Q21, we saw record Capex for Amazon, Meta and Microsoft. Looking forward, we are positive in optical transceiver markets, given that Cloud companies are increasing investments to support their cloud services and AI-related business. Most of them gave a very positive outlook for Capex. Google expects a meaningful increase in Capex and servers will be the largest driver of spend in technical infrastructure. Meta expects 85% YoY growth in Capex, which is primarily driven by investments in data centers, servers, network infrastructure, and office facilities.
- **Outlook for China optical transceiver market is positive.** Chinese suppliers of optical components and modules took 51% of market share in 2021, reaching a milestone that they surpassed its overseas peers for the first time. Policies in China will also be supportive given that optical communications are an important category under the "New Infrastructure" ("新基建"), which will support 5G, cloud computing and artificial intelligence. We believe Chinese suppliers will enjoy the increase of Cloud infrastructure spending and achieve good growth in 2022.
- **Top pick**: Innolight (300308 CH, BUY) is well positioned given its greater revenue exposure to global top Cloud companies (70% revenue from overseas). Potential risks include weaker capex from global cloud companies, slower deployment of 5G infrastructure and ASP pressure.

Figure 1: Domestic peers' valuation

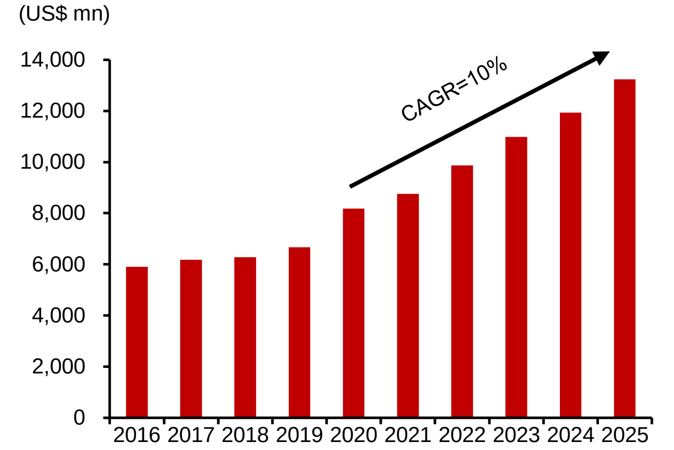
Company	Ticker	Rating	Mkt Cap US$(mn)	Price (LC)	TP (LC)	P/E (x) FY22E	P/B (x) FY22E	ROE (%) FY22E
Innolight	300308 CH	Buy	4,511	35.85	49.27*	23.1	2.6	11.9
Accelink Tech	002281 CH	NR	2,222	20.20	NA	21.0	2.3	11.9
Eoptolink Tech	300502 CH	NR	2,897	36.32	NA	21.9	3.9	17.1
	Average					**22.0**	**2.9**	**13.6**

Source: Bloomberg, CMBIS estimates
* TP under review.

Optical transceiver sector review

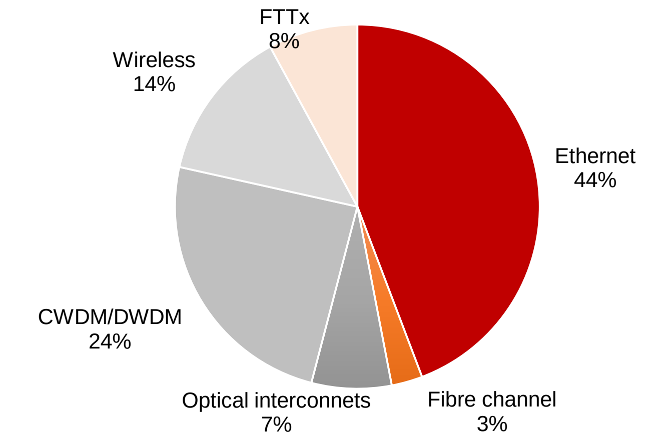
Global optical components and modules market has reached US$8.7bn in 2021. The market is expected to grow double-digit in 2022, driven by continuous investment from Cloud Service Providers (CSPs) and digital transformation needs from non-Cloud market. In 2021, supply chain shortage made supply fall short of demand. We think the risk will remain this year, at least during 1H22.

Figure 2: Optical transceiver market to grow at 10% CAGR (2020-2025)



Source: Lightcounting, CMBIS estimates

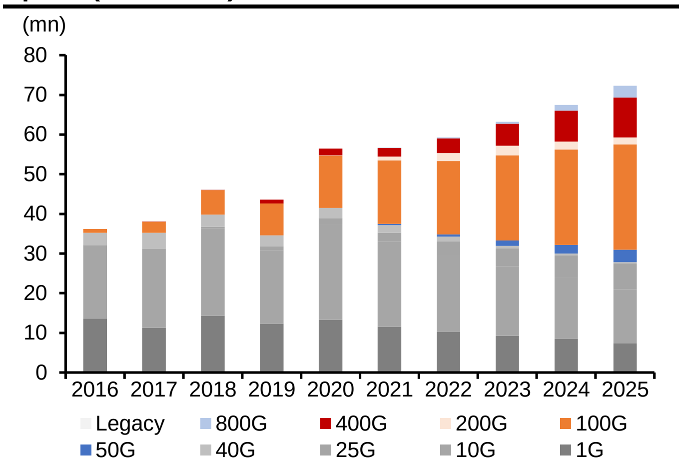
Figure 3: Sales of optical transceivers by market segment (2020)



Source: Lightcounting, CMBIS estimates

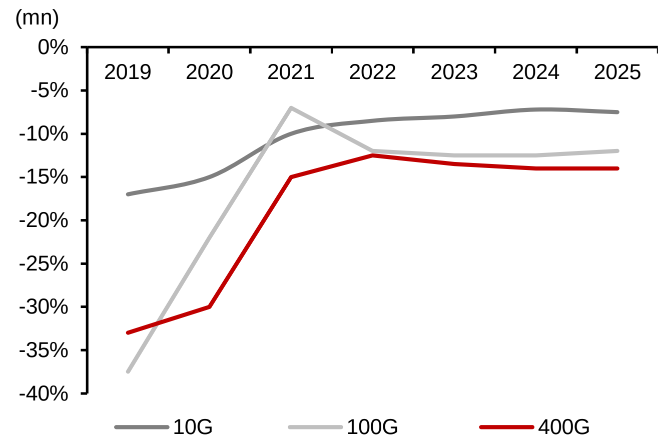
Despite supply shortage and Sino-U.S. trade tension, Chinese suppliers have achieved significant milestone in 2021, exceeding their overseas peers for the first time in 2021 (market share: 51% in 2021 vs. 21% in 2011). We believe the top Chinese suppliers will continue to outperform this year thanks to continuous investment from Cloud companies (upgrade for 200G/400G) and ongoing deployment of 5G. Price decline is expected to be ~15% based on Lightcounting's projections.

Figure 4: Ethernet optical transceiver shipment by speed (2016-2025)



Source: Lightcounting, CMBIS estimates

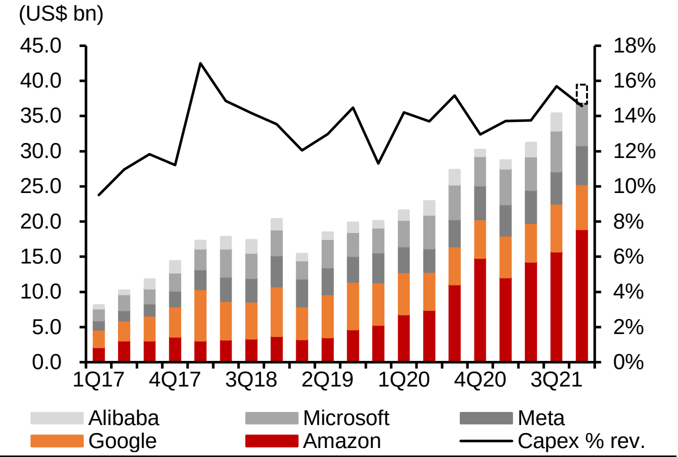
Figure 5: Ethernet optical transceivers ASP trend: 10G vs. 100G vs. 400G



Source: Lightcounting, CMBIS estimates

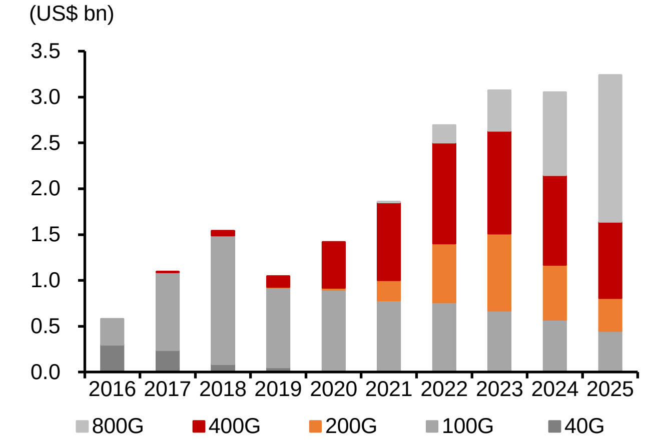
In 2021, 200G/400G upgrade demand was mostly driven by the top 4 overseas CSPs. According to Dell'Oro, major Cloud service providers will enter an expansion cycle in 2022. With the expectation of partially ease in supply chain and new opportunity in Metaverse, hyperscale cloud service providers are expected to increase investments on new server architectures, network upgrades and AI infrastructure.

Figure 6: Capex of the top 5 Cloud companies* keeps growing (2017-2021)



Source: Company data, Bloomberg, CMBIS estimates
*Note: Top 5 Cloud companies include Alibaba (4Q21 est.), Amazon, Meta, Google, and Microsoft.

Figure 7: Sales of Ethernet transceivers to the top 5 Cloud companies*



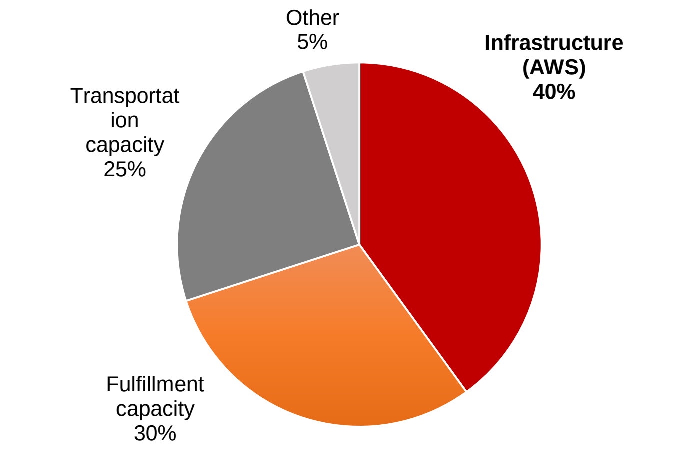
Source: Lightcounting, CMBIS estimates
*Note: Top 5 Cloud companies include Alibaba, Amazon, Facebook, Google, and Microsoft.

Chinese Internet Content Providers (ICPs) has started to upgrade their data centers with 200G and 400G optics from 25G and 100G optics since 2021. However, we saw demand from domestic Cloud companies become soft under new regulations. While the outlook for overseas hyperscale cloud service providers (CSPs) are optimistic, capex of China Cloud companies is expected to slightly recover on low base in 2022 given the ongoing uncertainty.

Implications for cloud infrastructure from recent 4Q21 results

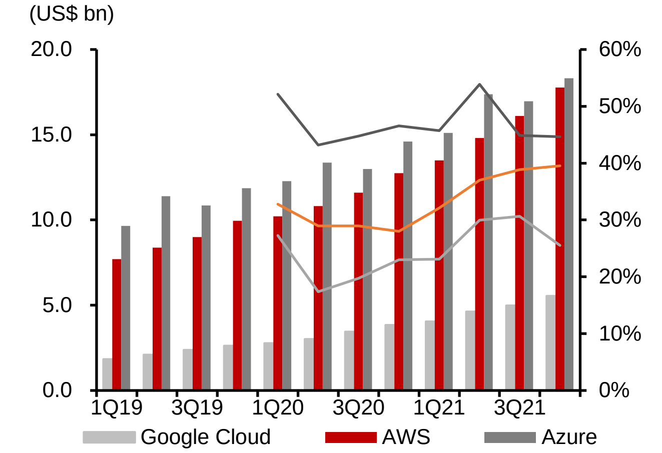
In 4Q21, we saw record capex for Amazon, Meta and Microsoft. Given that many companies are digitalizing, they need a distributed computing fabric to build, manage, secure, and deploy applications. Such demand will drive the growth of data centers and then the optical transceiver sales. Currently, 100G still dominates but hyperscale CSPs are ramping the deployment of 200G/400G optical modules. Google is already testing 800G solutions.

Figure 8: Amazon capex breakdown: 40% for infrastructure (2021)



Source: Company data, CMBIS estimates

Figure 9: Cloud segments continue to drive revenue growth for Cloud companies (2019-2021)



Source: Company data, CMBIS estimates

Looking forward, we are positive in optical transceiver markets, given that Cloud companies are increasing investments to support their cloud services and AI-related business. Most of them gave a very positive outlook for Capex (Figure 7). Google expects a meaningful increase in Capex and servers will be the largest driver of spend in technical infrastructure. Meta expects 85% YoY growth in Capex, which is primarily driven by investments in data centers, servers, network infrastructure, and office facilities.

Figure 10: Takeaways from CY4Q21 results

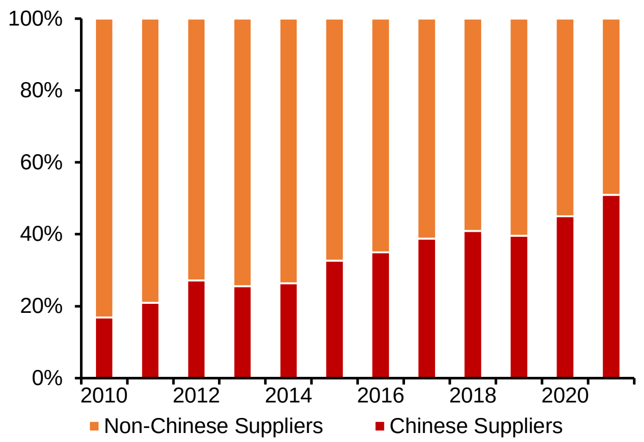
Company	Comments on Capex
Amazon	Amazon spent a record Capex of US$18.9bn in 4Q21. 40% of that Capex was "*going into infrastructure, most of it feeding AWS*". AWS was a fast growing business, whose growth were among 37%-40% YoY in the past three quarters.
Microsoft	Microsoft also had a record Capex of US$5.9bn. The company expects "*capital expenditures to be slightly down sequentially with normal quarterly variability in the timing of cloud infrastructure buildout.*"
Google	Google 4Q21 Capex of US$6.4bn grew 16.5% YoY, "*primarily reflect ongoing investment in technical infrastructure, most notably in servers, to support ongoing growth in both Google Services and Google Cloud.*" In 2022, the company expects "***a meaningful increase in CapEx. In technical infrastructure, servers will again be the largest driver of spend***."
Meta	Meta's CY21 Capex was US$21.5bn. The company expects "*2022 capital expenditures, including principal payments on finance leases, to be in the range of $29-34 billion, unchanged from our prior estimate*", **which suggests 85% YoY growth based on mid-point estimation**. The planned capital expenditures are "***primarily driven by investments in data centers, servers, network infrastructure, and office facilities***.*"*

Source: Company data, CMBIS

Positive outlook for Chinese optical components and modules suppliers

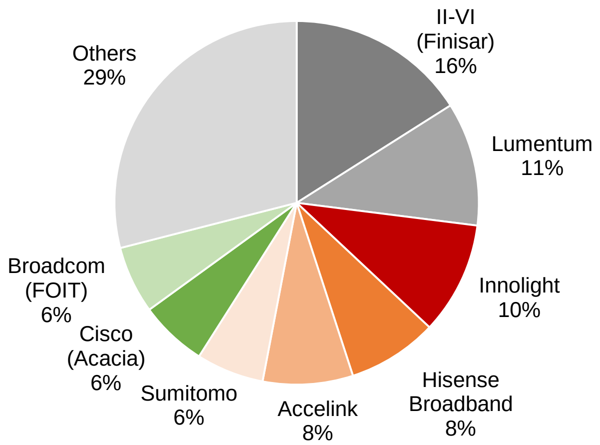
Chinese suppliers of optical components and modules took 51% of market share in 2021, reaching a milestone that they surpassed its overseas peers for the first time. Although the statistics include top 10 Chinese manufacturers of optical components and modules, the conclusion should be very similar for sales of optical transceivers suppliers according to Lightcounting.

Figure 11: Chinese suppliers of optical components and modules accounted for over 50% share in 2021



Source: Lightcounting, CMBIS estimates

Figure 12: Competitive landscape for optical transceiver market (2020)



Source: Yole, CMBIS estimates

Will the policy be supportive? China's 14th Five-Year Plan stated that the country will promote digital industrialization and industrial digitization. Optical communications are an important category in the "New Infrastructure" ("新基建"), which will support 5G, cloud computing and artificial intelligence.

During the past two decades, China has made great efforts in localization of assembly and testing of optical components and modules, establishing numerous domestic manufacturers of passive optical components and transceivers and etc. The 2035 goal is to transform China into a global center of innovation in optical communications technologies.

We believe Chinese suppliers will enjoy the increase of Cloud infrastructure spending and achieve good growth in 2022. Therefore, we hold a positive outlook for China optical transceiver market. We believe Innolight (300308 CH) is well positioned given its greater revenue exposure to global top Cloud companies.

Figure 13: Peers' valuation

			Mkt Cap	Price	TP	P/E (x)		P/B (x)		ROE (%)	
Company	Ticker	Rating	US$(mn)	(LC)	(LC)	FY22E	FY23E	FY22E	FY23E	FY22E	FY23E
Innolight	300308 CH	Buy	4,511	35.85	49.27*	23.1	18.8	2.6	2.3	11.9	12.6
Accelink Tech	002281 CH	NR	2,222	20.20	NA	21.0	18.7	2.3	2.0	11.9	12.2
Eoptolink Tech	300502 CH	NR	2,897	36.32	NA	21.9	17.9	3.9	3.3	17.1	17.3
HG Genuine	000988 CH	NR	3,832	24.23	NA	21.8	17.6	2.8	2.5	12.9	13.8
Lumentum	LITE US	NR	6,527	90.40	NA	15.8	13.5	3.1	2.6	21.1	20.9
Finisar	IIVI US	NR	6,589	62.08	NA	17.3	14.2	1.8	1.6	12.0	13.8
NeoPhotonics	NPTN US	NR	818	15.40	NA	53.5	29.6	5.0	-	-	-
	Average					**24.9**	**18.6**	**3.1**	**2.4**	**14.5**	**15.1**

Source: Bloomberg, CMBIS estimates
* TP under review.

Disclosures & Disclaimers

Analyst Certification

The research analyst who is primary responsible for the content of this research report, in whole or in part, certifies that with respect to the securities or issuer that the analyst covered in this report: (1) all of the views expressed accurately reflect his or her personal views about the subject securities or issuer; and (2) no part of his or her compensation was, is, or will be, directly or indirectly, related to the specific views expressed by that analyst in this report.

Besides, the analyst confirms that neither the analyst nor his/her associates (as defined in the code of conduct issued by The Hong Kong Securities and Futures Commission) (1) have dealt in or traded in the stock(s) covered in this research report within 30 calendar days prior to the date of issue of this report; (2) will deal in or trade in the stock(s) covered in this research report 3 business days after the date of issue of this report; (3) serve as an officer of any of the Hong Kong listed companies covered in this report; and (4) have any financial interests in the Hong Kong listed companies covered in this report.

CMBIS Ratings

BUY	: Stock with potential return of over 15% over next 12 months
HOLD	: Stock with potential return of +15% to -10% over next 12 months
SELL	: Stock with potential loss of over 10% over next 12 months
NOT RATED	: Stock is not rated by CMBIS

OUTPERFORM	: Industry expected to outperform the relevant broad market benchmark over next 12 months
MARKET-PERFORM	: Industry expected to perform in-line with the relevant broad market benchmark over next 12 months
UNDERPERFORM	: Industry expected to underperform the relevant broad market benchmark over next 12 months

CMB International Securities Limited

Address: 45/F, Champion Tower, 3 Garden Road, Hong Kong, Tel: (852) 3900 0888 Fax: (852) 3900 0800

CMB International Securities Limited ("CMBIS") is a wholly owned subsidiary of CMB International Capital Corporation Limited (a wholly owned subsidiary of China Merchants Bank)

Important Disclosures

There are risks involved in transacting in any securities. The information contained in this report may not be suitable for the purposes of all investors. CMBIS does not provide individually tailored investment advice. This report has been prepared without regard to the individual investment objectives, financial position or special requirements. Past performance has no indication of future performance, and actual events may differ materially from that which is contained in the report. The value of, and returns from, any investments are uncertain and are not guaranteed and may fluctuate as a result of their dependence on the performance of underlying assets or other variable market factors. CMBIS recommends that investors should independently evaluate particular investments and strategies, and encourages investors to consult with a professional financial advisor in order to make their own investment decisions.

This report or any information contained herein, have been prepared by the CMBIS, solely for the purpose of supplying information to the clients of CMBIS or its affiliate(s) to whom it is distributed. This report is not and should not be construed as an offer or solicitation to buy or sell any security or any interest in securities or enter into any transaction. Neither CMBIS nor any of its affiliates, shareholders, agents, consultants, directors, officers or employees shall be liable for any loss, damage or expense whatsoever, whether direct or consequential, incurred in relying on the information contained in this report. Anyone making use of the information contained in this report does so entirely at their own risk.

The information and contents contained in this report are based on the analyses and interpretations of information believed to be publicly available and reliable. CMBIS has exerted every effort in its capacity to ensure, but not to guarantee, their accuracy, completeness, timeliness or correctness. CMBIS provides the information, advices and forecasts on an "AS IS" basis. The information and contents are subject to change without notice. CMBIS may issue other publications having information and/ or conclusions different from this report. These publications reflect different assumption, point-of-view and analytical methods when compiling. CMBIS may make investment decisions or take proprietary positions that are inconsistent with the recommendations or views in this report.

CMBIS may have a position, make markets or act as principal or engage in transactions in securities of companies referred to in this report for itself and/or on behalf of its clients from time to time. Investors should assume that CMBIS does or seeks to have investment banking or other business relationships with the companies in this report. As a result, recipients should be aware that CMBIS may have a conflict of interest that could affect the objectivity of this report and CMBIS will not assume any responsibility in respect thereof. This report is for the use of intended recipients only and this publication, may not be reproduced, reprinted, sold, redistributed or published in whole or in part for any purpose without prior written consent of CMBIS.

Additional information on recommended securities is available upon request.

For recipients of this document in the United Kingdom

This report has been provided only to persons (I)falling within Article 19(5) of the Financial Services and Markets Act 2000 (Financial Promotion) Order 2005 (as amended from time to time)("The Order") or (II) are persons falling within Article 49(2) (a) to (d) ("High Net Worth Companies, Unincorporated Associations, etc.,) of the Order, and may not be provided to any other person without the prior written consent of CMBIS.

For recipients of this document in the United States

CMBIS is not a registered broker-dealer in the United States. As a result, CMBIS is not subject to U.S. rules regarding the preparation of research reports and the independence of research analysts. The research analyst who is primary responsible for the content of this research report is not registered or qualified as a research analyst with the Financial Industry Regulatory Authority ("FINRA"). The analyst is not subject to applicable restrictions under FINRA Rules intended to ensure that the analyst is not affected by potential conflicts of interest that could bear upon the reliability of the research report. This report is intended for distribution in the United States solely to "major US institutional investors", as defined in Rule 15a-6 under the US, Securities Exchange Act of 1934, as amended, and may not be furnished to any other person in the United States. Each major US institutional investor that receives a copy of this report by its acceptance hereof represents and agrees that it shall not distribute or provide this report to any other person. Any U.S. recipient of this report wishing to effect any transaction to buy or sell securities based on the information provided in this report should do so only through a U.S.-registered broker-dealer.

For recipients of this document in Singapore

This report is distributed in Singapore by CMBI (Singapore) Pte. Limited (CMBISG) (Company Regn. No. 201731928D), an Exempt Financial Adviser as defined in the Financial Advisers Act (Cap. 110) of Singapore and regulated by the Monetary Authority of Singapore. CMBISG may distribute reports produced by its respective foreign entities, affiliates or other foreign research houses pursuant to an arrangement under Regulation 32C of the Financial Advisers Regulations. Where the report is distributed in Singapore to a person who is not an Accredited Investor, Expert Investor or an Institutional Investor, as defined in the Securities and Futures Act (Cap. 289) of Singapore, CMBISG accepts legal responsibility for the contents of the report to such persons only to the extent required by law. Singapore recipients should contact CMBISG at +65 6350 4400 for matters arising from, or in connection with the report.