

ECO INTERNET INDUSTRY MONITOR: CONSEQUENCES OF THE UKRAINE CRISIS

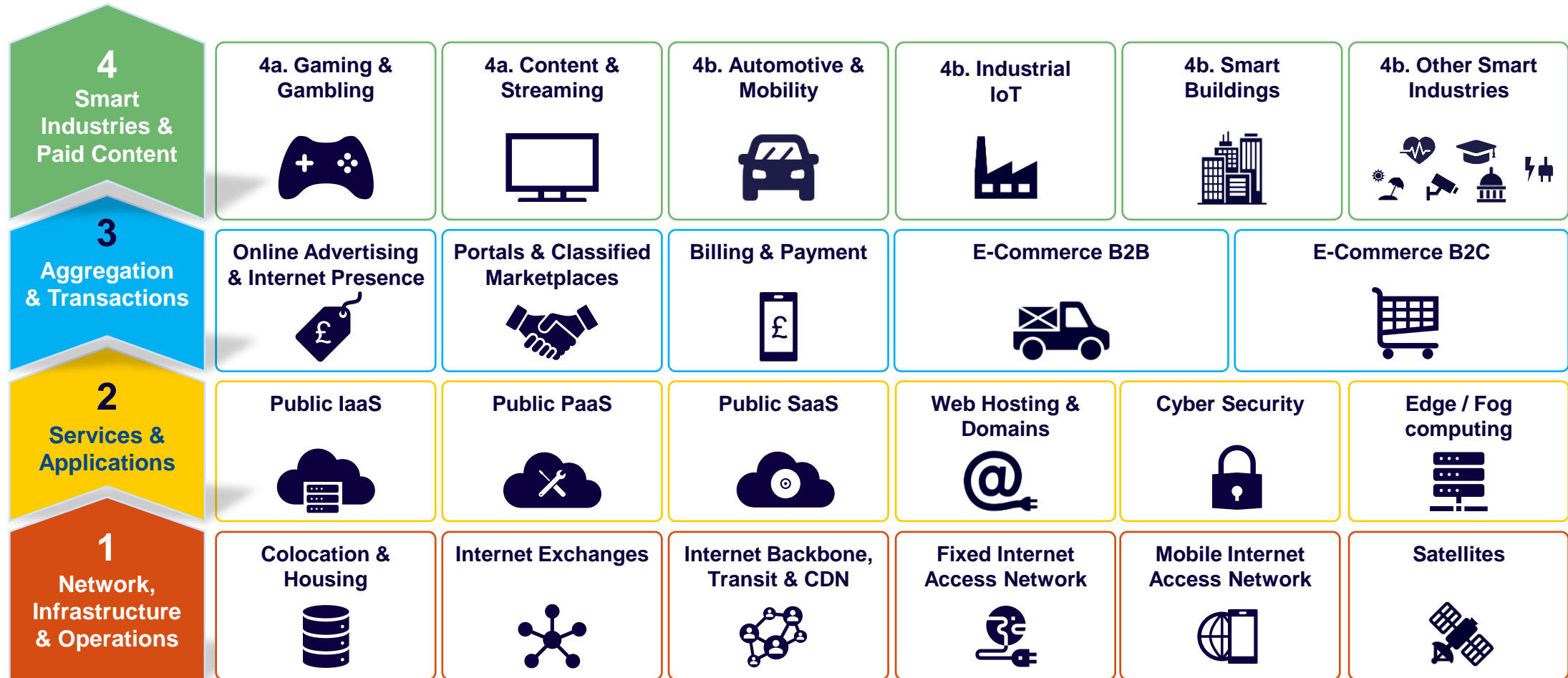
Updated Report 2022

May 2022



ARTHUR D LITTLE

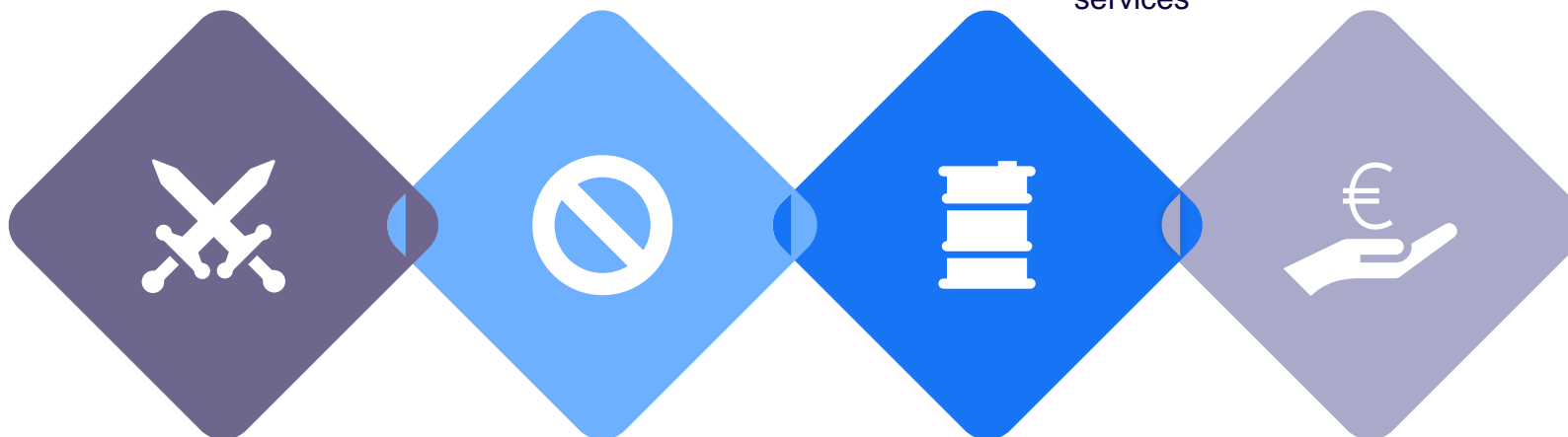
The eco Association and Arthur D. Little have compiled an update of the study on the Internet Industry in Germany 2022 – 2025



The eco / Arthur D. Little layer model for mapping the Internet industry continues to serve as the basis for the eco Index

The Ukraine-Russia conflict is a humanitarian and geopolitical crisis that will affect the German economy in terms of inflation

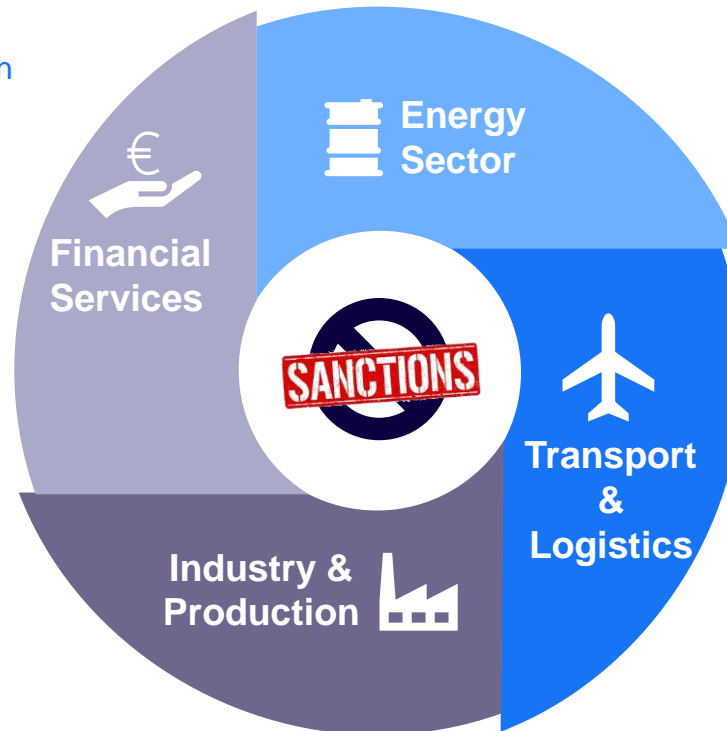
- **Global financing** in a vice-like grip
- **Sanctions**, freezing of assets, depreciation, withdrawals
- **Liquidity shortages**, higher financing costs
- **Substantial medium-term inflation** worldwide, in all sectors, especially for energy importers such as Germany
- **Price increases** for the majority of Internet industry services



- **Humanitarian crisis** that has already displaced more than a quarter of the Ukrainian population
- **Geopolitical catastrophe** that runs the risk of escalating into an extended European conflict, dividing the world into a 'for-or-against-us' camp
- **Volatile and skyrocketing energy prices** (oil, gas)
- **Shortages of industrial raw materials** (steel, aluminium) and basic foodstuffs (wheat, cooking oil)
- **Shortage of technical raw materials** (Ni, Pd, Ne)

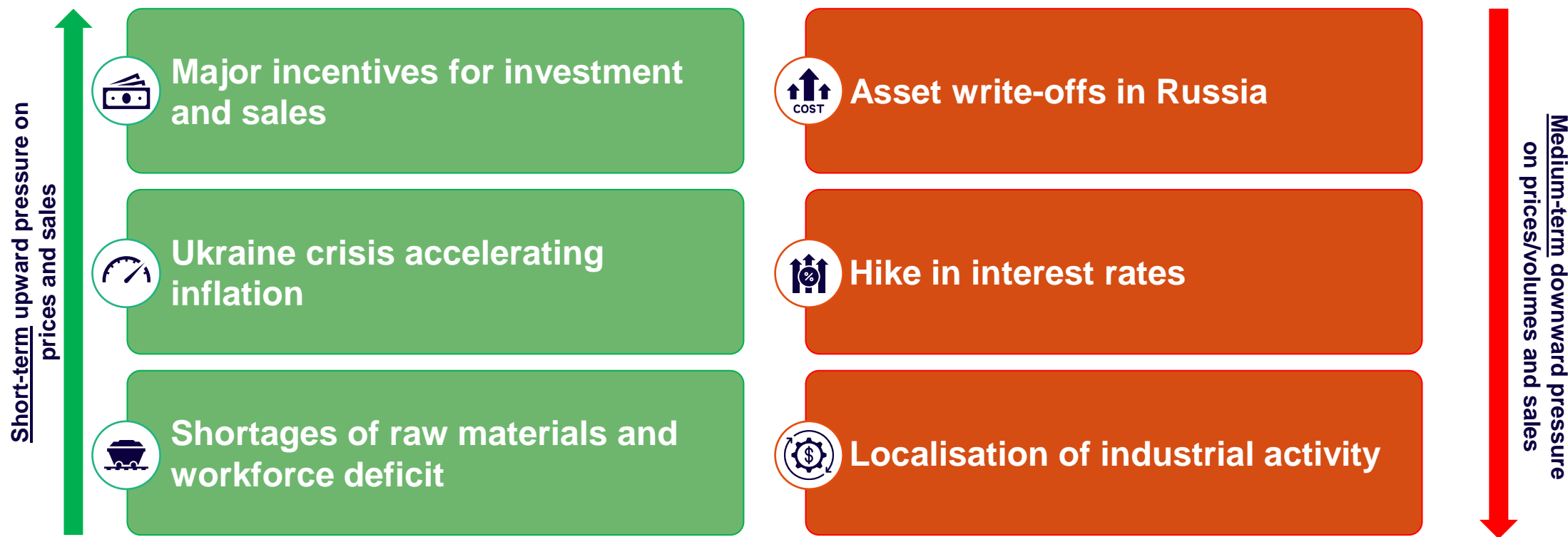
Apart from persistent inflation and self-imposed restrictions, the impact on the German TMT sector is quite limited compared to other industries

- Ban on the SWIFT payment system
- Freezing of foreign currency reserves
- Likely insolvency of the Russian state
- German banks compelled to write off Russian assets and subsidiaries
- Export ban on technologies and chips
- German car, manufacturing and retail industries closing Russian plants
- German chemical industry likely to collapse if Russian gas is banned
- Voluntary restrictions on cooperation between German TMT companies and Russian firms leading to tangible negative revenue effects
- Otherwise, just a limited impact on the German TMT sector, as there are almost no major subsidiaries/investments in Russia



- Freezing of the Nord Stream 2 gas project
- Ban on Russian coal (from 22 August)
- Curtailment of Russian oil and gas supplies
- German energy companies compelled to write off existing infrastructure and cope with higher input prices
- Reciprocal closure of airspace
- Tariffs, reduction of exports
- Impoundment of Russian ships and other assets
- German transport and logistics companies inevitably facing business losses

Inflation putting price pressure on the Internet industry, leading to short-term revenue growth – followed by a medium-term realignment



Economic effects are accompanied by further growth in Internet service use in the TMT sector – this is shown, for example, by the development of Internet traffic as exemplified by DE-CIX (see its deep dive)

Sales effects do not necessarily lead to positive profitability effects, as production costs also increase significantly. In certain segments of the Internet industry, even a dip in margins can be expected, as not all cost increases can be passed on to customers

The driving forces behind the price increases are rising energy prices, a workforce deficit, shortages of key raw materials and the localisation of activities

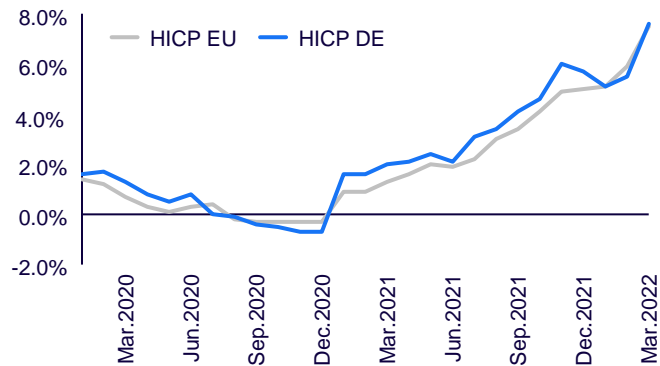


Economic indicators also lead to contrasting prognoses, suggesting short-term price increases, but also a possible reduction in the medium term



Harmonised Consumer Price Index (HCPI) EU & DE

% HCPI per year

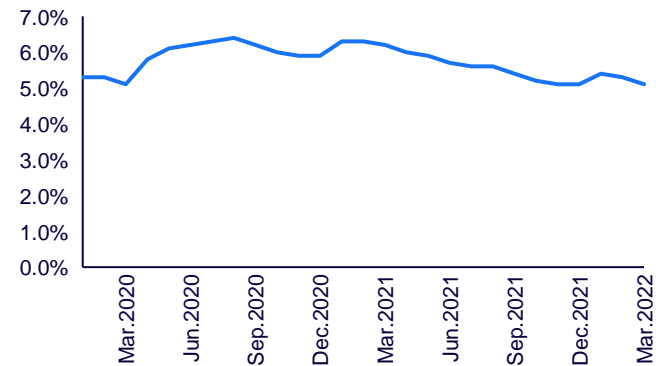


- **Inflation**, as measured by the Harmonised Consumer Price Index, is at its highest level in 30 years in the Eurozone and also in Germany
- While central banks in most industrial countries have raised interest rates, the ECB has been slow to react
- In the short term this will lead to **further price increases** (also in the TMT sector) but in the medium term to a **sharp reduction** as the ECB catches up and raises interest rates sharply



Unemployment Rates DE

% Unemployment rates

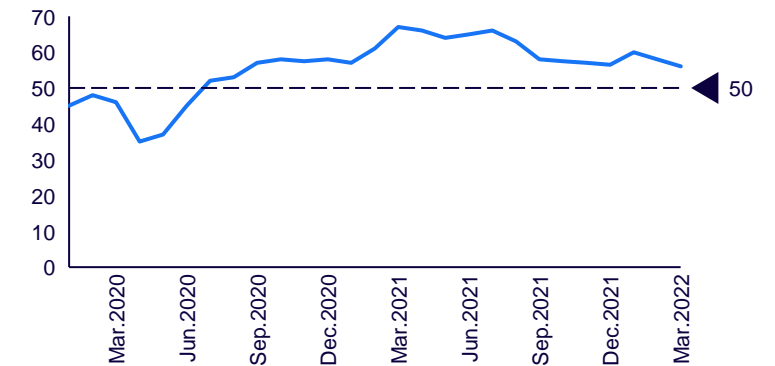


- **Unemployment rates** in Germany – as in most developed economies – are generally quite low, leading to higher recruitment and retention costs
- This in turn places **companies under pressure to raise prices** so as to counterbalance higher labour costs
- The influx of foreign workers, including Ukrainian refugees, could somewhat alleviate the workforce deficit in the medium term



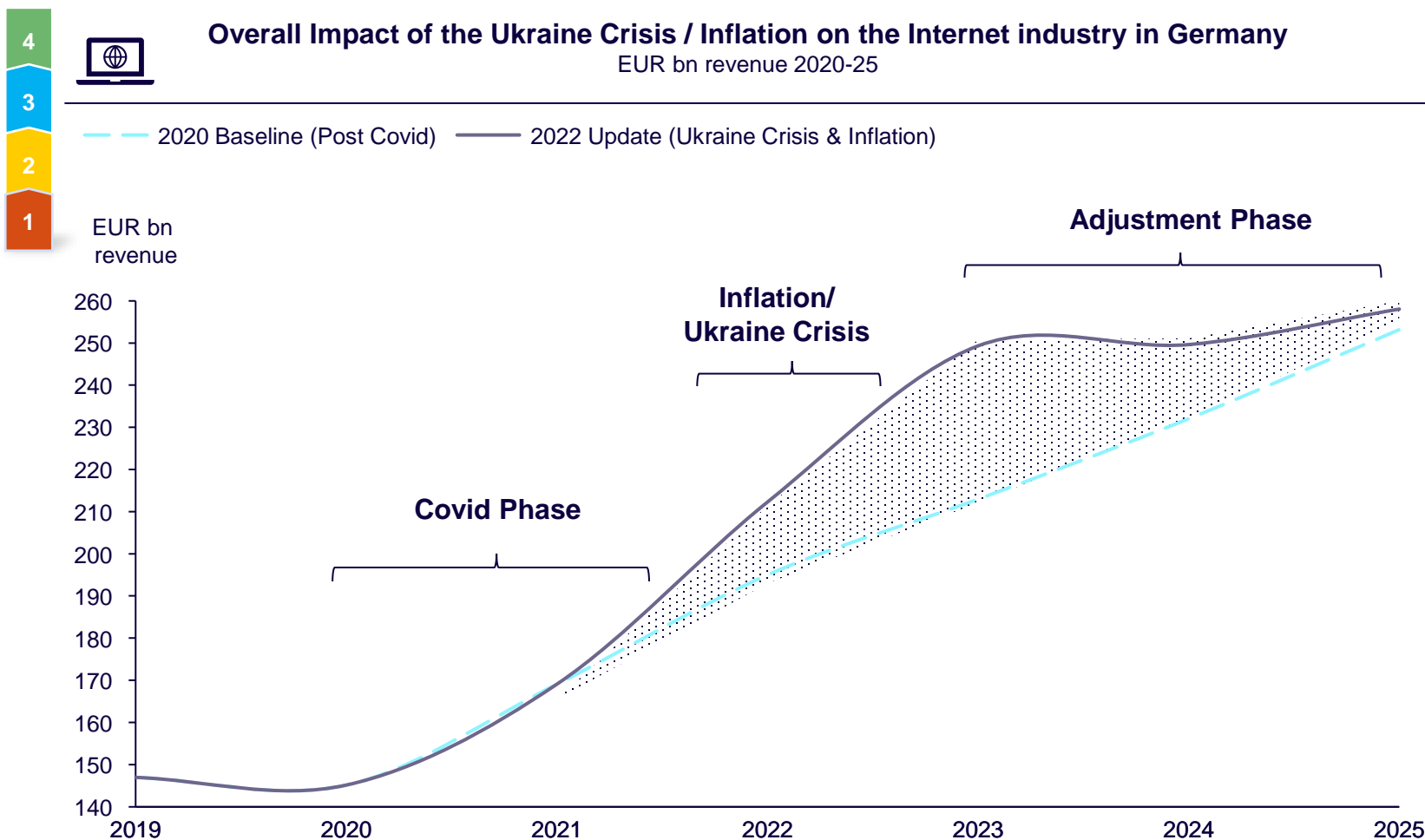
BME Purchasing Managers Index (PMI) DE

BME EMI Index



- The **BME Purchasing Managers' Index (PMI)** is a forecast indicator of German economic development
- Values above 50 indicate positive business development of industrial companies compared to the previous month, while an index below 50 points indicates a negative trend
- The trend for Q1 2022 indicates a **deterioration in the economic outlook**

The Ukraine crisis has exacerbated inflation in an already overheated economy, leading to higher volatility with short-term spikes & medium-term lows in economic activity



Observations

- The **Covid Phase** has led to rising sales in the Internet industry – the “new normal” and working from home have significantly increased demand for services in most segments
- **Inflation** and the **Ukraine crisis** are leading to further price increases on all 4 layers and thus reinforce the trend in the short term (however, without compelling profitability effects, as production costs rise more strongly in some cases)
- The **Adjustment Phase** is very probable in the medium term, due to the likely normalisation of the demands in many segments or the reflection of the crisis effects in spending patterns

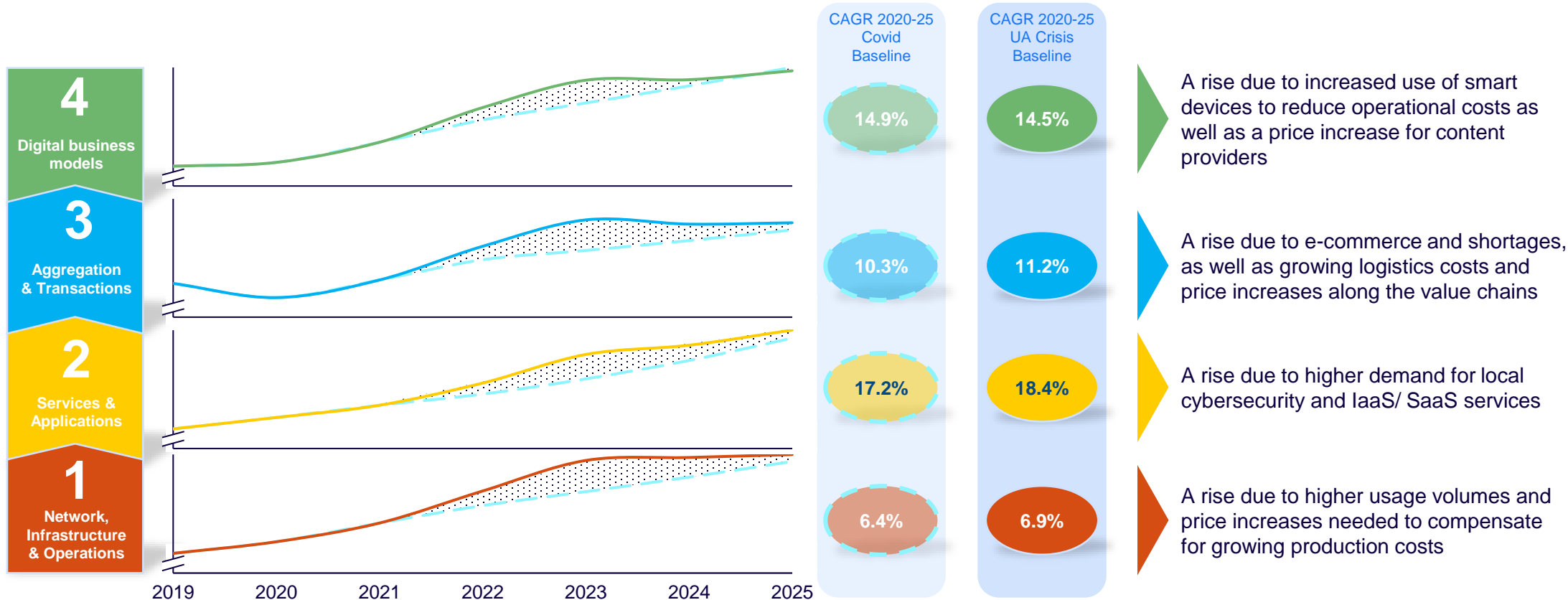
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Impact on Individual Layers of the Internet Industry

EUR bn revenue 2020-25

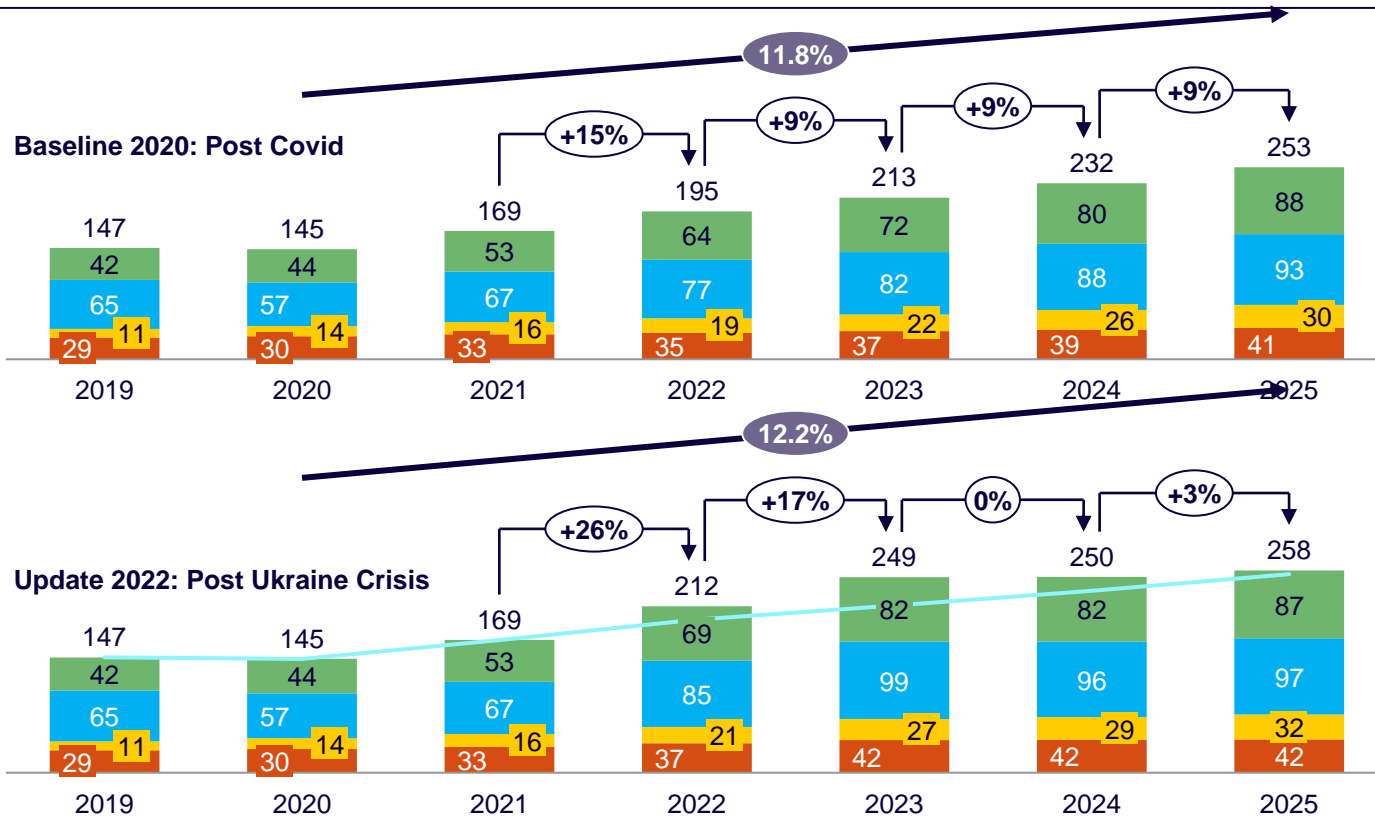
Observations



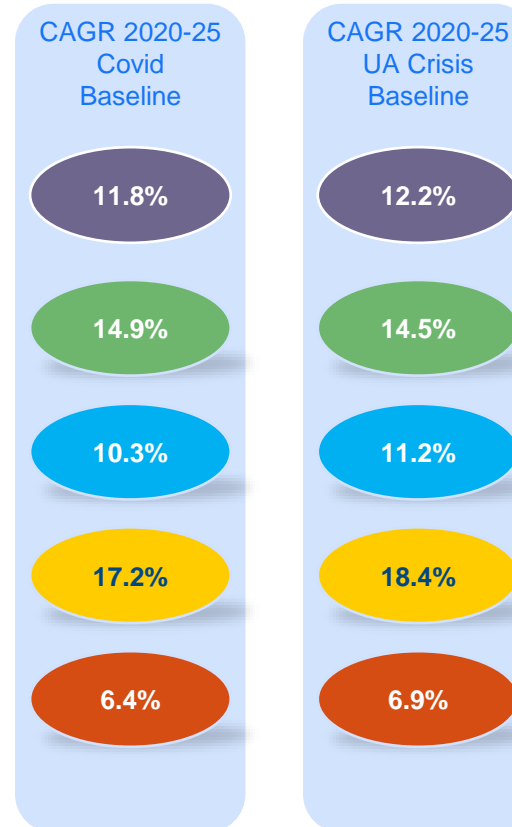
In the short term, a rise in inflation-related prices will increase revenues; in the medium term, there is a risk of an economic recession



Revenue of the Internet Industry in Germany
EUR bn 2020-25

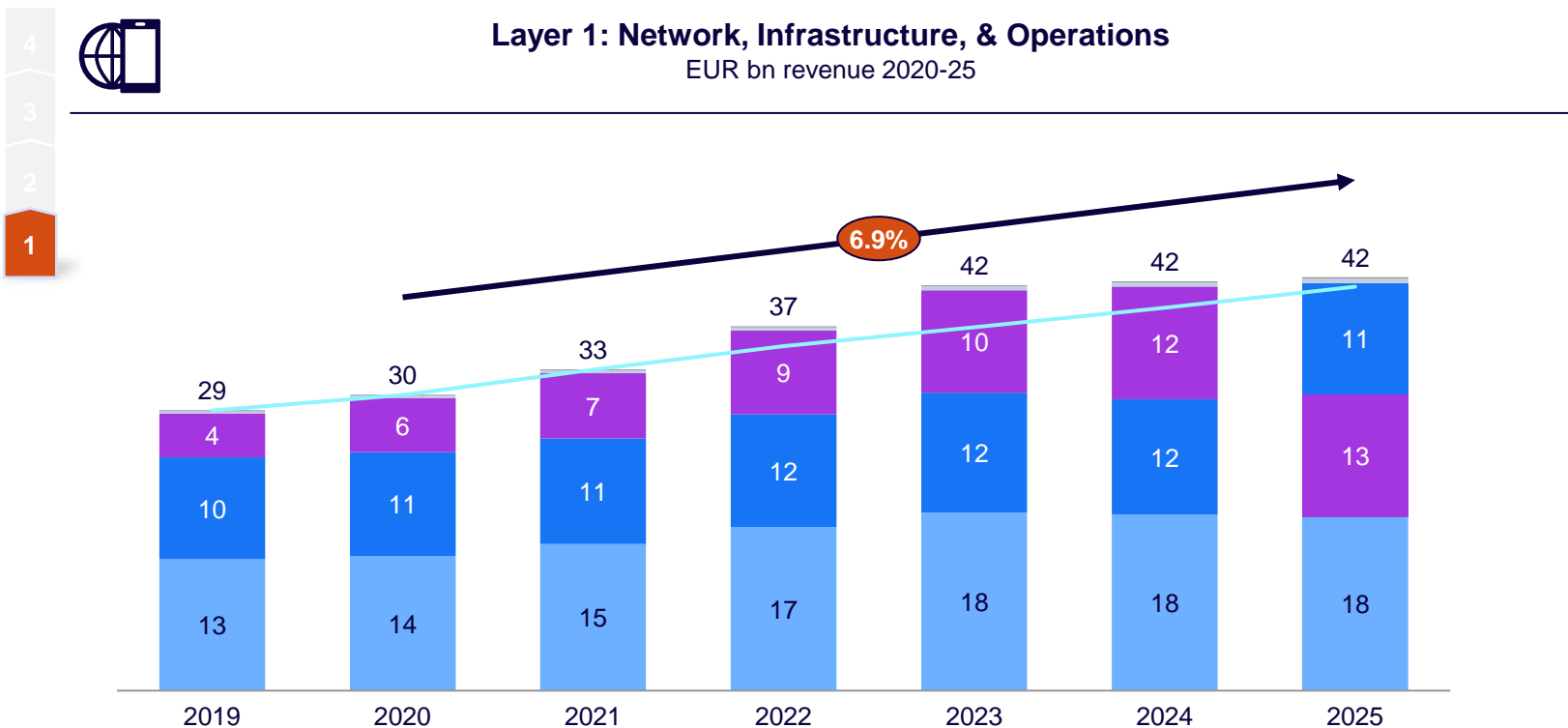


CAGR of the Layers



■ Layer 4: Content & Smart Industries
 ■ Layer 2: Services & Applications
 — 2020 Baseline (Post Covid)
■ Layer 3: Aggregation & Transactions
 ■ Layer 1: Network, Infrastructure & Operations

Short-term increase in Layer 1 revenues expected as inflation rises and growth continues; EU / USA strengthening cooperation due to Ukraine conflict



Observations

- Inflation has led to price increases of 5-10% for fixed and mobile services at most major telecom providers such as Deutsche Telekom, Vodafone, and others in Europe – offsetting self-imposed restrictions on cooperation with Russian companies
- In Layer 1, the loss of revenue (e.g. due to waiver of charges for calls to/from Ukraine) or write-offs of Russia-related assets (e.g. closure of DT's development centre) is not significant

■ Colocation & Housing ■ Fixed Internet Access Network — 2020 Baseline (Post Covid)
■ Internet Exchanges ■ Mobile Internet Access Network
■ Internet Backbone, Transit & CDN ■ Satellite Internet

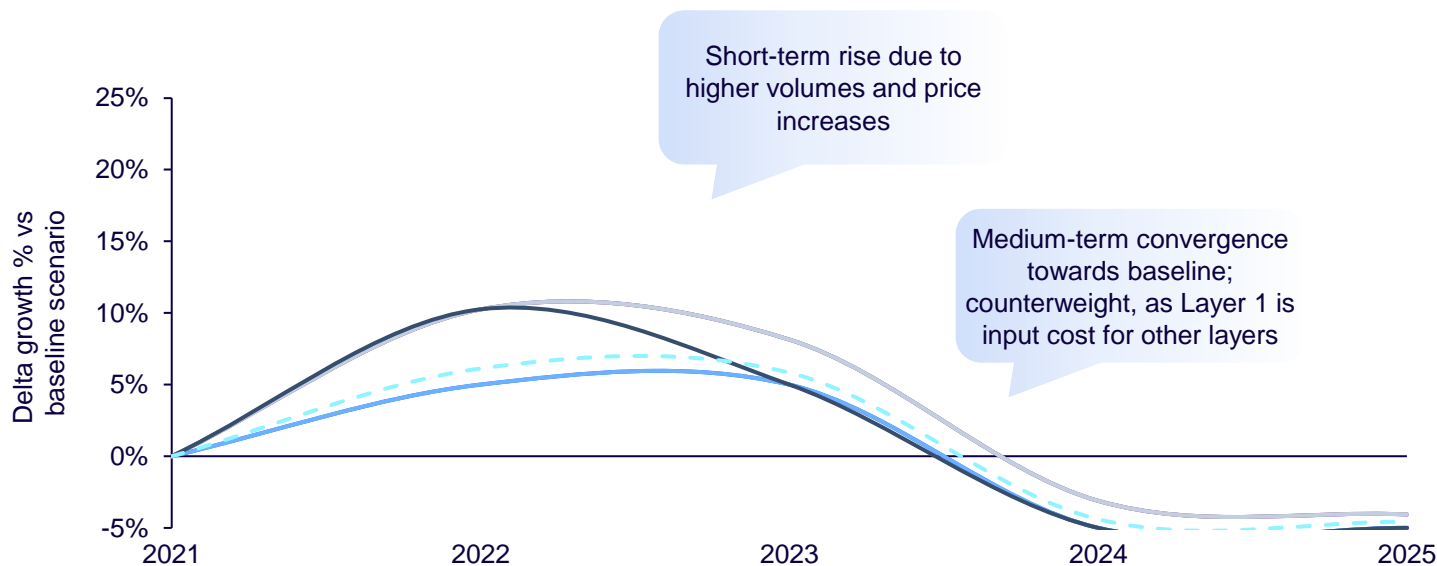
Short-term increase in Layer 1 revenues expected as inflation rises and growth continues; EU / USA strengthening cooperation due to Ukraine conflict



Layer 1: Network, Infrastructure, & Operations

Delta % Points vs Baseline (Post-Covid) Growth

Observations



- Colocation & Housing
- Internet Exchanges
- Internet Backbone, Transit & CDN
- Fixed Internet Access Network
- Mobile Internet Access Network
- Satellite Internet
- Layer 1: Network, Infrastructure & Operations vs Baseline

- The Q1/2022 [transatlantic data protection agreement between the US and the EU](#) will enable an even greater flow of data across the world's busiest information superhighway and boost business in all related communications and data processing infrastructures: Internet backbone, transit, CDN, Internet Exchanges, colocation and housing – even though this announcement has not yet been implemented, it represents an important prerequisite for the sector's further development
- In the medium term, Layer 1 revenues are expected to converge with [baseline trends](#), as Layer 1 services constitute a crucial cost component for the services of Layers 2, 3 and 4, and these create a balance

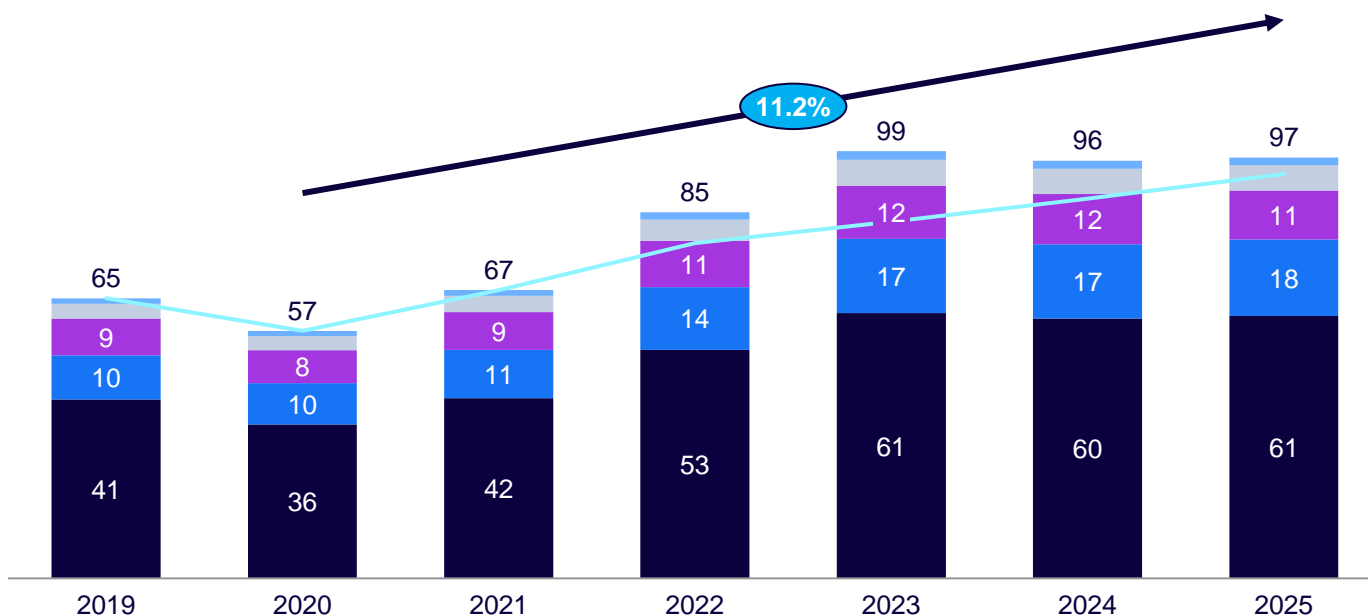
Layer 3 services are likely to increase in the short term due to inflation; a reduction is expected in the medium term as economies endeavour to curb price increases



Layer 3: Aggregation & Transaction

EUR bn revenue 2020-25

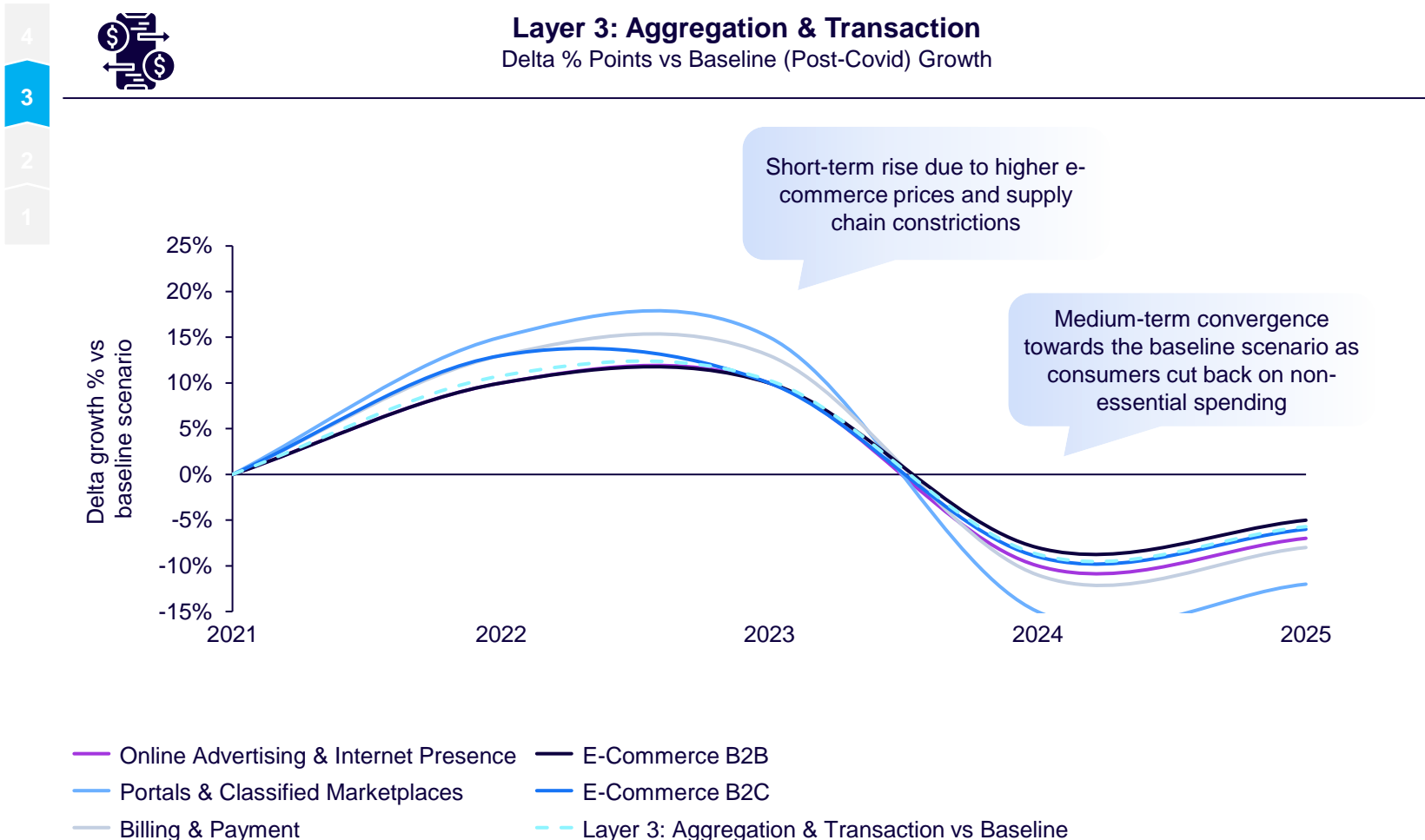
Observations



- Layer 3 services are more affected by inflation and macroeconomic factors than Layers 1 and 2
- Prices for advertising, portals and marketplaces are expected to rise in line with inflation (e.g. Amazon Prime 10-20% price increase in the US, forecast also for the EU)
- E-commerce fees, which depend on the price of the underpinning goods and services, are also likely to rise as inflation increases prices

■ Online Advertising & Internet Presence
 ■ Billing & Payment
 ■ E-Commerce B2C
■ Portals & Classified Marketplaces
 ■ E-Commerce B2B
 — 2020 Baseline (Post Covid)

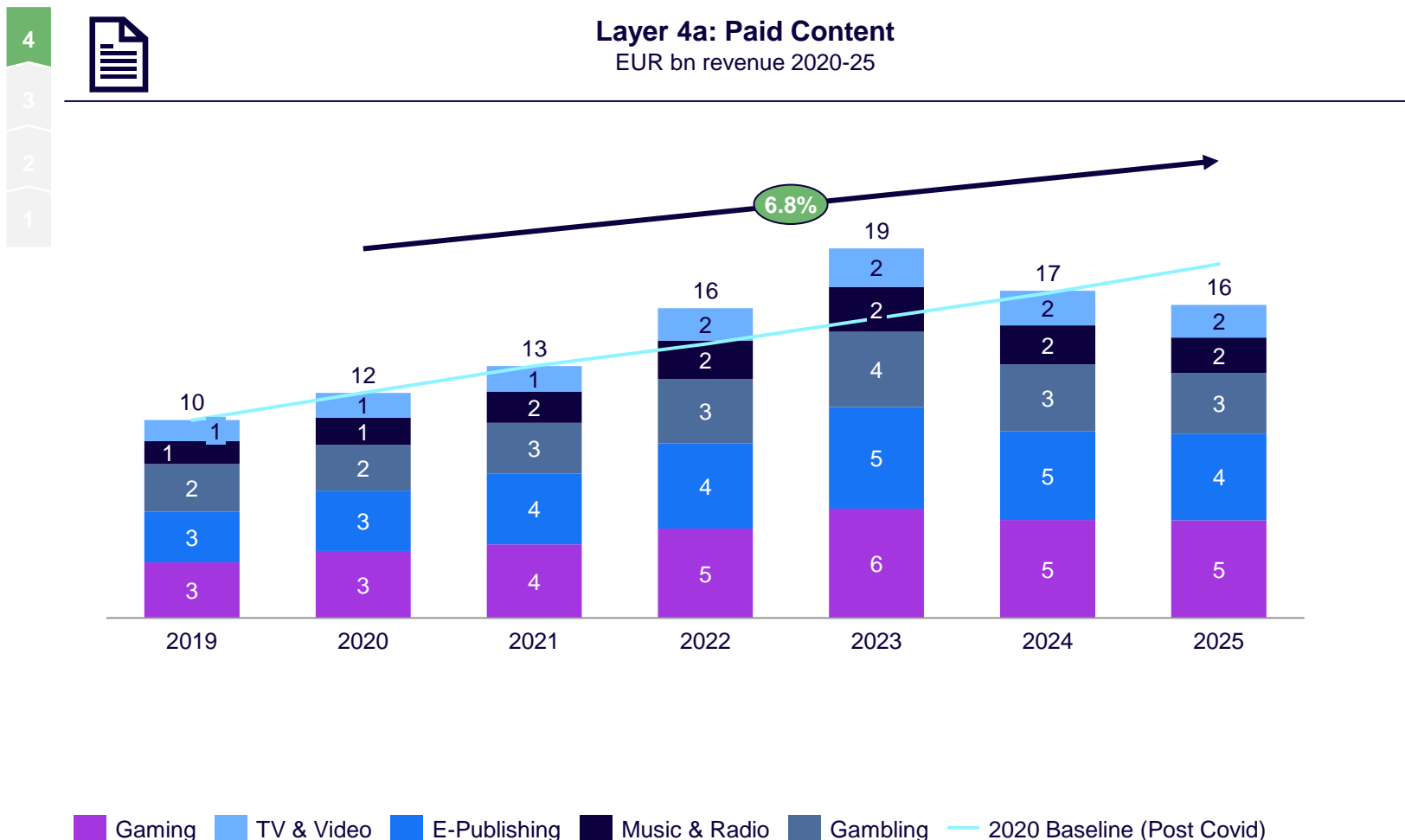
Layer 3 services are likely to increase in the short term due to inflation; a reduction is expected in the medium term as economies try to curb price increases



Observations

- A **counter-effect** is that the regulatory authorities (especially the EU Commission) are investigating the above-average fees of 30% charged by players such as Apple and Google, and in the medium term will push for a reduction to a more moderate level of 10-15%
- In the medium term, when high inflation leads to either high interest rates and/or an economic downturn, we expect the **pressure on Layer 3 services to ease** as consumers **cut back on their non-essential spending** and short-term inflation-induced price increases fall to more sustainable levels

In Layer 4a content services, a strong inflation-related rise is expected in the short term; in the medium term, the overall trend will drop below the original level



Observations

- Layer 4 services are most affected by **inflation and macroeconomic factors**, even more so than the services from Layers 1, 2 and 3.
- Almost all content service providers (Netflix, Spotify, Sky and **telecom companies**) have increased the prices of their products by 10-20% between Q4 2021 and Q1 2022, driving up their short-term revenue forecasts
- However, the price mark-up for the underpinning content makes such measures unsustainable in the medium term

In Layer 4a content services, a strong inflation-related rise is expected in the short term; in the medium term, the overall trend will drop below the original level

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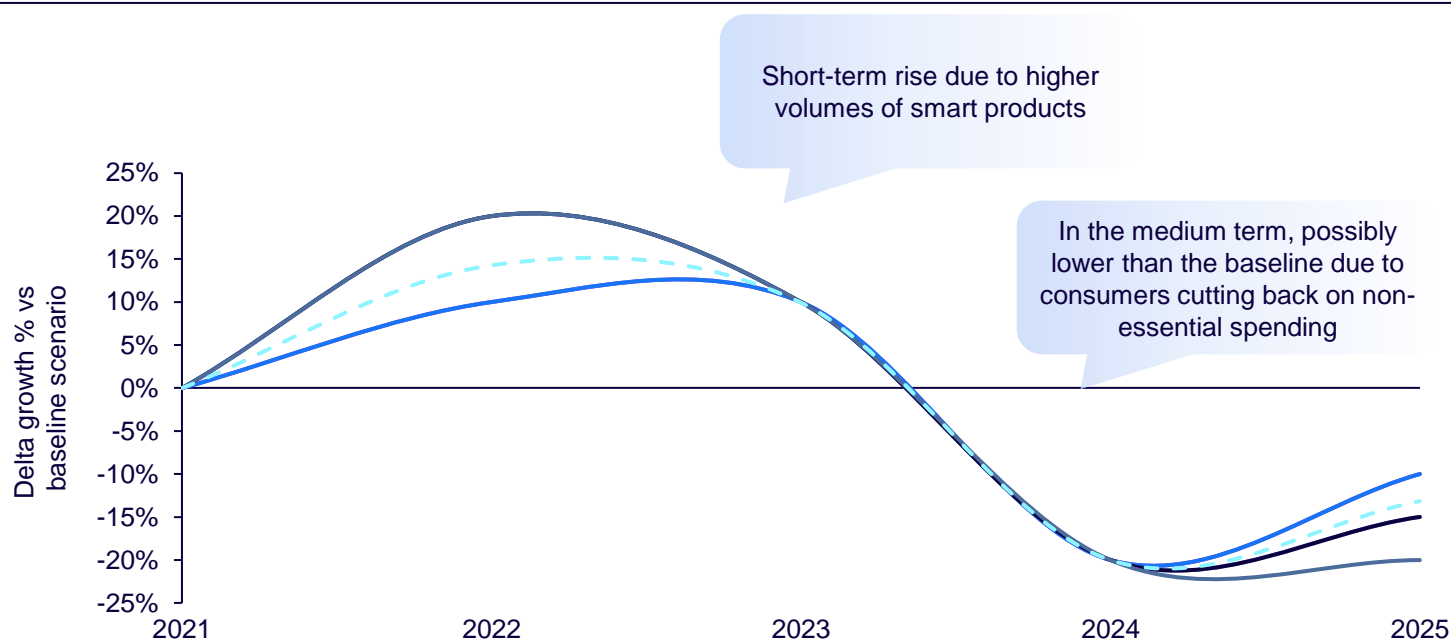


Layer 4a: Paid Content

Delta % Points vs Baseline (Post-Covid) Growth

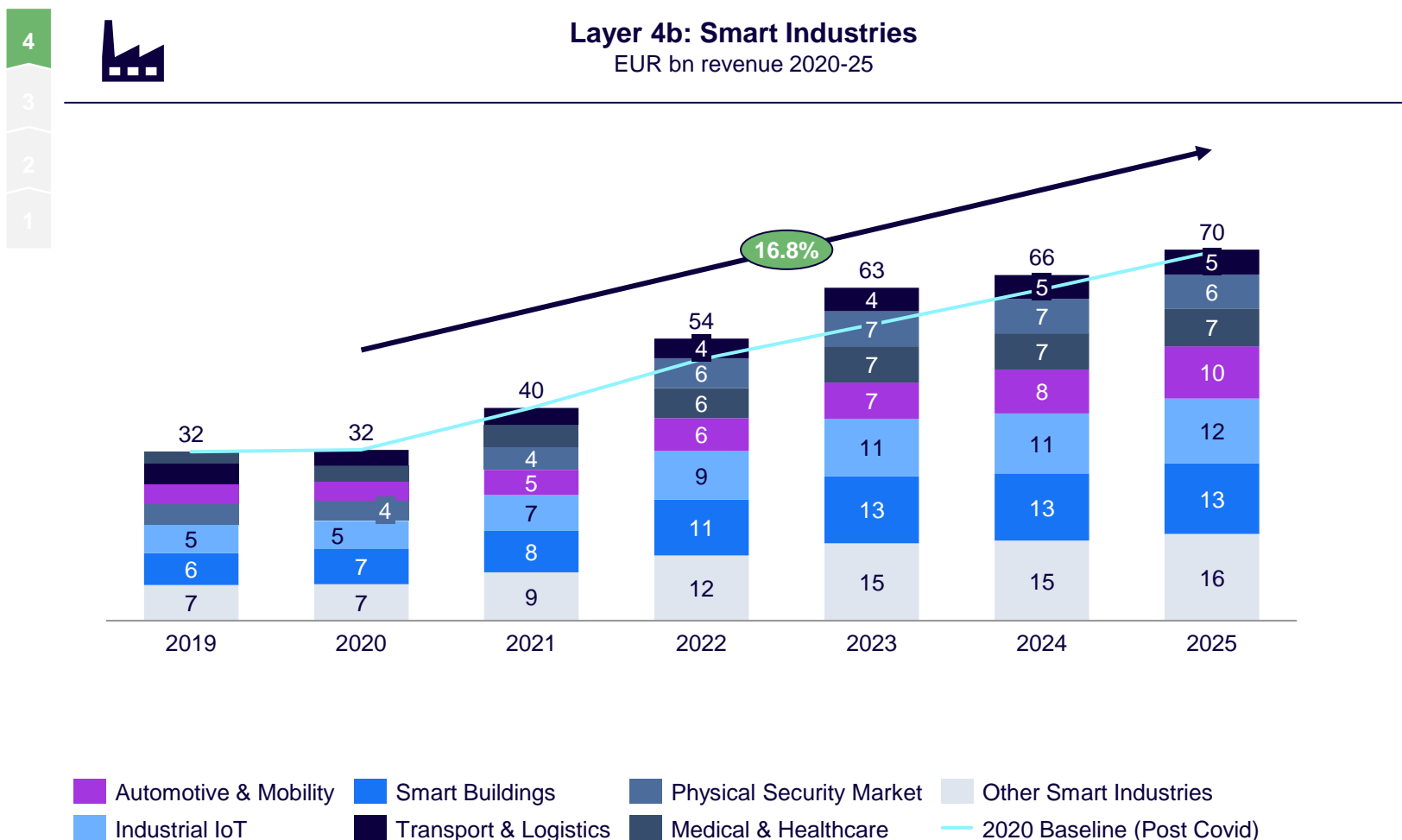
Observations

- The inflation-related increased cost of baseline services is likely to force customers to cut back on **non-essential spending**, e.g. on higher-value content or subscriptions to multiple providers, resulting in a decrease in volume and earnings
- Should high inflation lead to either high interest rates and/or an economic downturn in the medium term, we would foresee a further downward trend on Layer 4 content revenues, which could **lower the trend set out in the baseline forecast**



— Gaming
 — E-Publishing
 — Gambling
— TV & Video
 — Music & Radio
 - - - Layer 4a: Paid Content vs Baseline

In Layer 4b, Smart Industries will grow due to the trend to save costs in the short term and to switch to recurring smart services in the medium term



Observations

- Layer 4 services are most affected by **inflation and macroeconomic factors**, even more so than the services from Layers 1, 2 and 3
- The rise in underpinning utility prices **accelerates the shift to smart appliances**, especially to reduce energy consumption
- Industrial customers/cities/municipalities are also **modernising their networks** to reduce underpinning energy and raw material costs
- The Smart Car industry will be the only sector to suffer in the short term, due to the combination of high oil prices and battery shortages

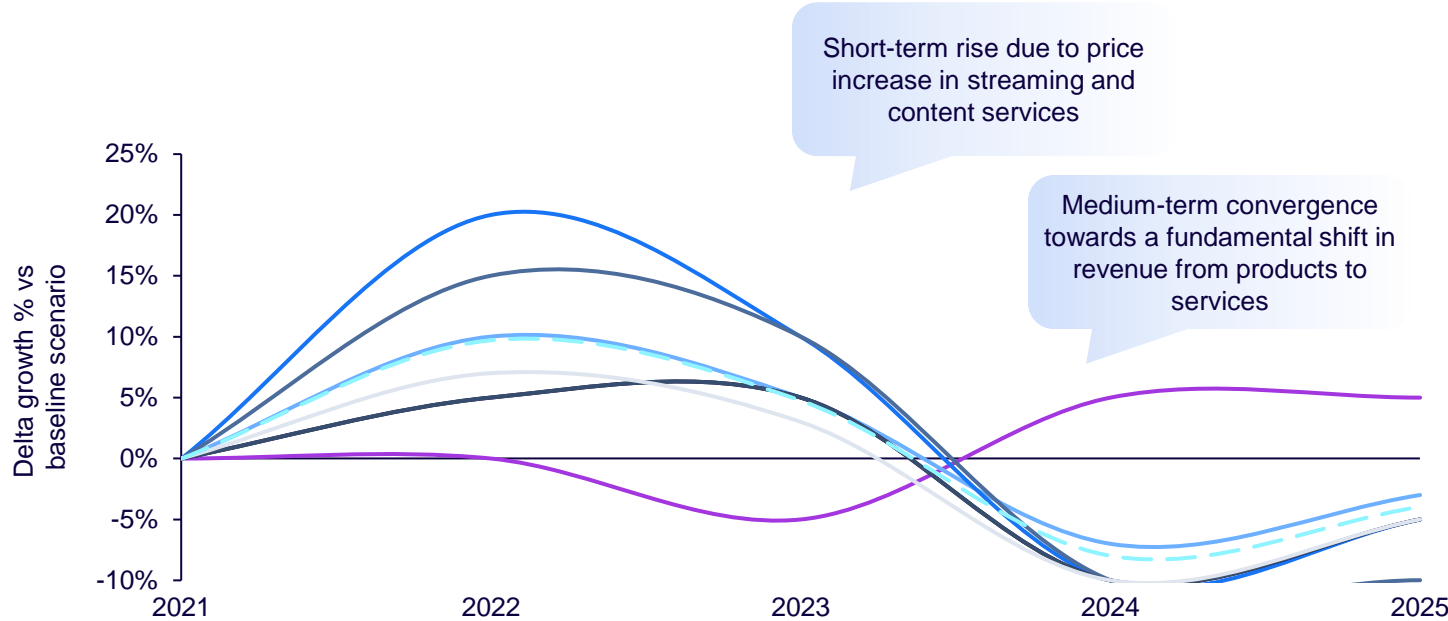
In Layer 4b, Smart Industries will grow due to the trend of saving costs in the short term and switching to recurring smart services in the medium term



Layer 4b: Smart Industries
Delta % Points vs Baseline (Post-Covid) Growth

Observations

- The German smart meter plan for 2032 is **lagging behind** (e.g. E.ON has 0.1 million smart meters in Germany compared to 1.0 million in Sweden) and is likely to accelerate in the medium term
- Smart solution providers will tend to **shift their revenues from one-off product sales to recurring services** (e.g. €5/month for a smart thermostat that saves 30% energy), which will stabilise revenues in the medium term
- Self-imposed restrictions on cooperation with Russian companies will be offset; An economic downturn will **continue to put pressure on revenues**, albeit to a lesser extent than for content services

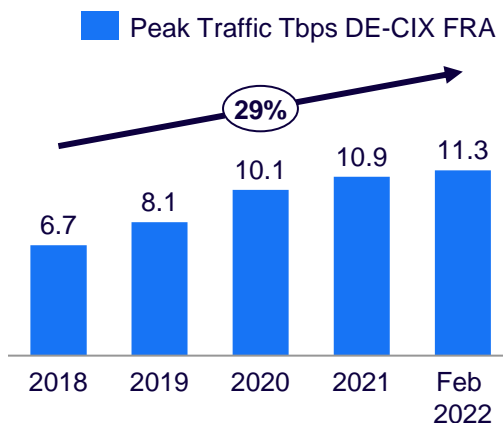


- Automotive & Mobility
- Industrial IoT
- Smart Buildings
- Transport & Logistics
- Physical Security Market
- Medical & Healthcare
- Other Smart Industries
- Layer 4b: Digital Business Models in User Industries vs Baseline

Digital infrastructure is becoming increasingly important: Data from Germany's largest Internet Exchange shows a significant increase in data traffic

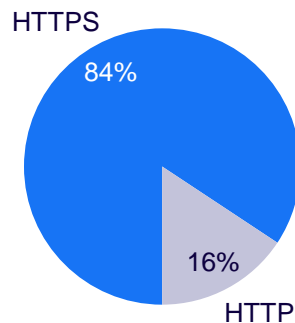


The volume of Internet data traffic is rising steadily



- Peak loads (and average volumes) of Internet traffic at DE-CIX in Frankfurt have increased by 29%

The utilisation of secure Internet protocols is reaching new highs



- Use of HTTPS already accounts for 82% of PC-based and 84% of mobile Internet traffic – an indicator of a major need to implement IT security on the part of the Internet infrastructure
- HTTP/2+ already uses 60% of advanced TLS 1.3 encryption methods - HTTP/1.1 still uses 40%

New forms of Internet traffic require modern security procedures

Rang #	Top 10 Ports (TCP - IPv4)	Traffic Share %
1	443 - HTTPS	35%
2	80 - HTTP	11%
3	8080 - HTTP	1.4%
4	8200 TRIVNET	0.6%
5	25461 - IPTV	0.5%
6	1935 - Macromedia-fsc	0.3%
7	22 - SSH	0.3%
8	25565 - Minecraft Server	0.2%
9	30303 - Kryptomining	0.2%
10	5223 - hpvirtgrp	0.2%

- Web traffic and surfing on the Internet occupies places 1 to 3 in the ranking of usage categories
- New use cases such as cloud gaming (Minecraft) and cryptomining have emerged in the top 10 in 2021

Secure digital infrastructure is also essential in the current crisis situation – usage parameters continue to trend upwards

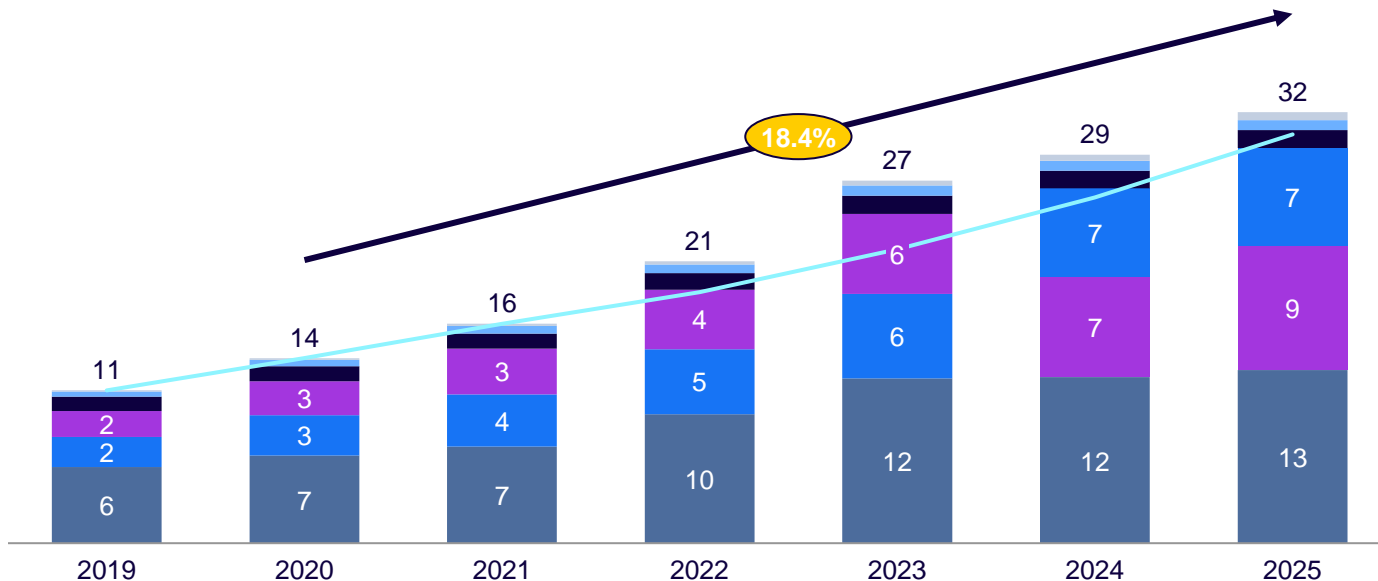
Layer 2 services are expected to expand in the near future due to both heightened cybersecurity requirements and inflation



Layer 2: Services & Applications

EUR bn revenue 2020-25

Observations



- The Ukraine crisis has led to an increase in cyberattacks on Ukrainian, Russian and Western targets (e.g. Italian railways in March 2022), increasing the readiness to **spend more on cybersecurity products**. Mandates to reduce dependence on Russian solutions (e.g. Kaspersky) create opportunities for local solution providers
- The eco IT Security Survey 2022¹ reveals that 94% of TMT companies believe the risk of IT threats has increased this year (compared to 77% in 2021), while 71% are of the view that existing cybersecurity systems are inadequate (compared to 57% in 2021)
- A major cyber war that would target German companies on a massive scale and lead to a drop of revenue is unlikely. However, insecurity and risks remain high and should be prevented in the future by secure and more robust IT systems and infrastructures

■ Public IaaS
 ■ Public SaaS
 ■ Cybersecurity
 — 2020 Baseline (Post Covid)

■ Public PaaS
 ■ Web Hosting & Domains
 ■ Edge / Fog Computing

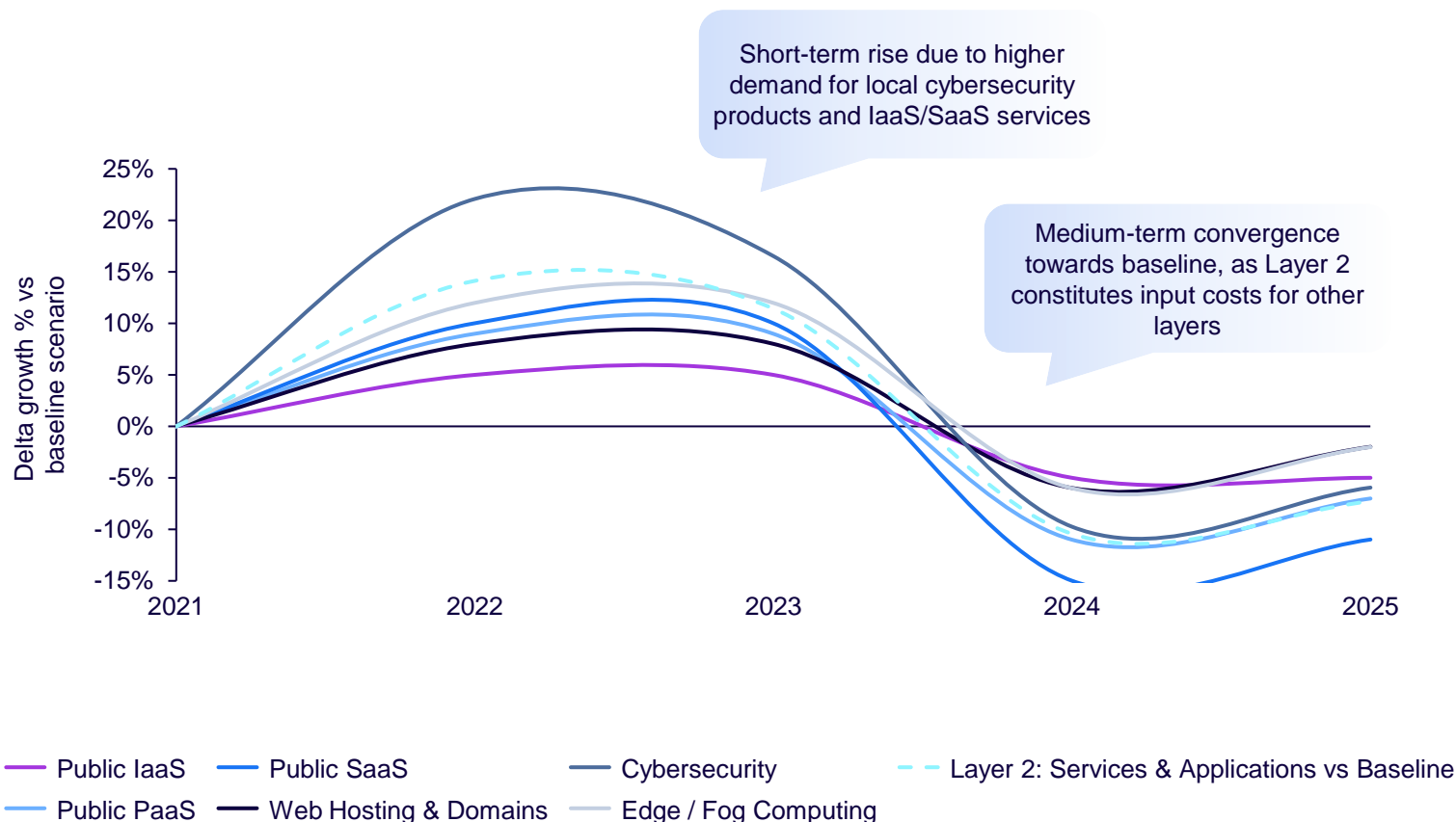
Layer 2 services are expected to expand in the near future due to increased cybersecurity requirements and inflation

4
3
2
1

Layer 2: Services & Applications

Delta % Points vs Baseline (Post-Covid) Growth

Observations



- Most SaaS and PaaS providers have **increased their prices by 10-20% in 2022** (e.g. Microsoft Office 365 – the first 10-20% price increase in almost 10 years). In the short term, prices for other SaaS/PaaS services are likely to increase in line with inflation
- So far, **IaaS prices have been stable**, but with rising energy prices and the global chip shortage, it is likely that IaaS prices will also increase by 10-20% in the short term
- In the medium term, Layer 2 revenues are expected to **converge with the baseline trend**, as Layer 2 services constitute a crucial cost component for Layer 3 and 4 services

The German TMT industry is being impacted by inflation, exacerbated by the Ukraine crisis, leading to short-term revenue growth

““

Price increases for mobile communications and the Internet ... subscription fees, data volume, minutes of talk time, text messages...

Die Welt



““

Microsoft ... 1 March 2022
Price increases for various products ... for the first time in 10 years

Telekom.de



““

Dynamic prices ... no longer the same for everyone ... frequently and significantly changing in a short period of time

VerbraucherZentrale.de



““

The introduction of intelligent metering systems (smart meters) ... saves effort, time and money

Bundesministerium bmwi.de



““

Without gas, nothing works... The German economy depends on gas supplies in multiple ways ... Without gas and oil ... the industry does not function ... And without the industry ... the economy does not function

Frankfurter Allgemeine

Summary

- **Short-term rise in revenues** in all four segments (which are offsetting negative sanction effects) due to inflation-related price increases as well as a trend towards “localisation” and the security of **local infrastructure, services and consumption**
- Medium-term risk of an economic downturn and consumers trying to save on non-essential services, which may lead to a **convergence towards the baseline** and, in some cases, a decline in revenues relative to the baseline.
- Overall, **uncertainty in the TMT industry and among customers** is very high – meaning there needs to be a focus on activities that help reduce uncertainty and thus support investment and business development. Examples for this are the Privacy Shield 2.0, energy sovereignty, localisation/nearshoring, investment incentives, etc.
- However, both inflation and the economic downturn may **put pressure** on the sector’s **net margins**



ASSOCIATION OF THE
INTERNET INDUSTRY

ARTHUR D LITTLE