Nokia views on the EU's Chips Act proposal

July 2022

Nokia welcomes the EU Chips Act package proposal. Chips and microelectronics are at the heart of the modern digitized economy and will enable future technology driven transformation to drive digital-physical fusion and communications in the 2030s. Access to leading-edge chips is key for competitiveness of the European economy and its industrial champions; as well as for the EU's technological leadership and strategic autonomy. Therefore, political attention to trusted and resilient semiconductor supply chain is merited. Nokia supports policies aimed at strengthening the European chips and microelectronics value chain.

Summary of policy recommendation

Nokia appreciates the EU's resolve to strengthen Europe's technological leadership and to address semiconductor shortages**.** To advance European strategic autonomy, policy intervention needs to be bold and beyond short term market perspective.

- Industrial leadership requires leading-edge and custom chips. Prioritize reinforcing European chips design capabilities, in particular for future-proof and strategic domains such as telecommunication infrastructure, building on existing assets. Leverage 6G/telco as cross-sector enabler and critical technology, where Europe maintains a leadership position.
- To grow European chips design 1) lower the costs associated with the development of chips and 2) support growing the talent pipeline and necessary skills across the future workforce.
- Foster collaboration within the EU and across member states as well as international trusted collaboration. Secure central role of the EU in implementing the Chips Act to ensure consistent and strategic investment (limiting duplication; preventing dis-jointed approaches, responding to the fact that a single design or a chipset family are often developed tapping into resources from design centers in different member states).
- Direct industry inputs are needed to define which support actions would be most impactful.
- Monitoring supply chain situation is needed, but it must be arranged in a way that limits exposure of confidential data.
- A response to the chips shortage needs to be multifaceted, targeting all potential choke points. Strategic collaboration with reliable international partners should aim at filling the

© 2022 Nokia

gaps, increasing capacity and diversification along the full supply chain (substrates, packaging and testing, fabrication). Desired outcome should be collective supply chain resilience among trusted partners.

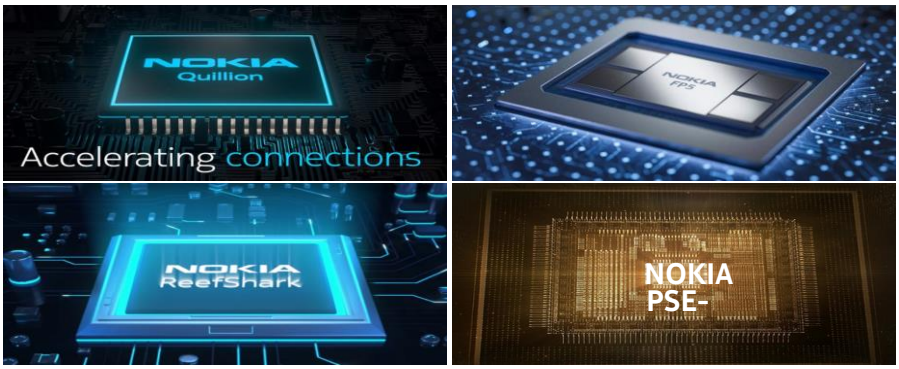
- EC institutional capability for joint procurement is doubtful.

1 About Nokia

At Nokia, we create technology that helps the world act together.

Nokia delivers the industry's most comprehensive portfolio of network equipment, software, and services that is available globally. Our customers include communications service providers, as well as enterprises in the private and public sector. Nokia technology enables connections for 6.6 billion mobile subscriptions and 500 million fixed broadband lines connecting homes and businesses around the world. A leader in each generation of wireline and wireless communications equipment, we are driving the world to adopt 5G and 5G Advanced networks that are faster, more secure and reliable, and capable of revolutionizing lives, economies, and societies.

As a trusted partner for critical networks, we are committed to innovation and technology leadership. We create value with intellectual property and long-term research, led by the award-winning Nokia Bell Labs. Chips play a crucial role in creating the next generation superior technologies for mobile, fixed, optical and IP networks. Nokia's Quillion, FP5, ReefShark and PSE-V are all successful Nokia's Application Specific Integrated Circuits (ASICs), developed in-house across 11 excellence centers located in Europe (Finland, Belgium, France, Germany, Poland, Italy, UK) as well as in the US and Canada.



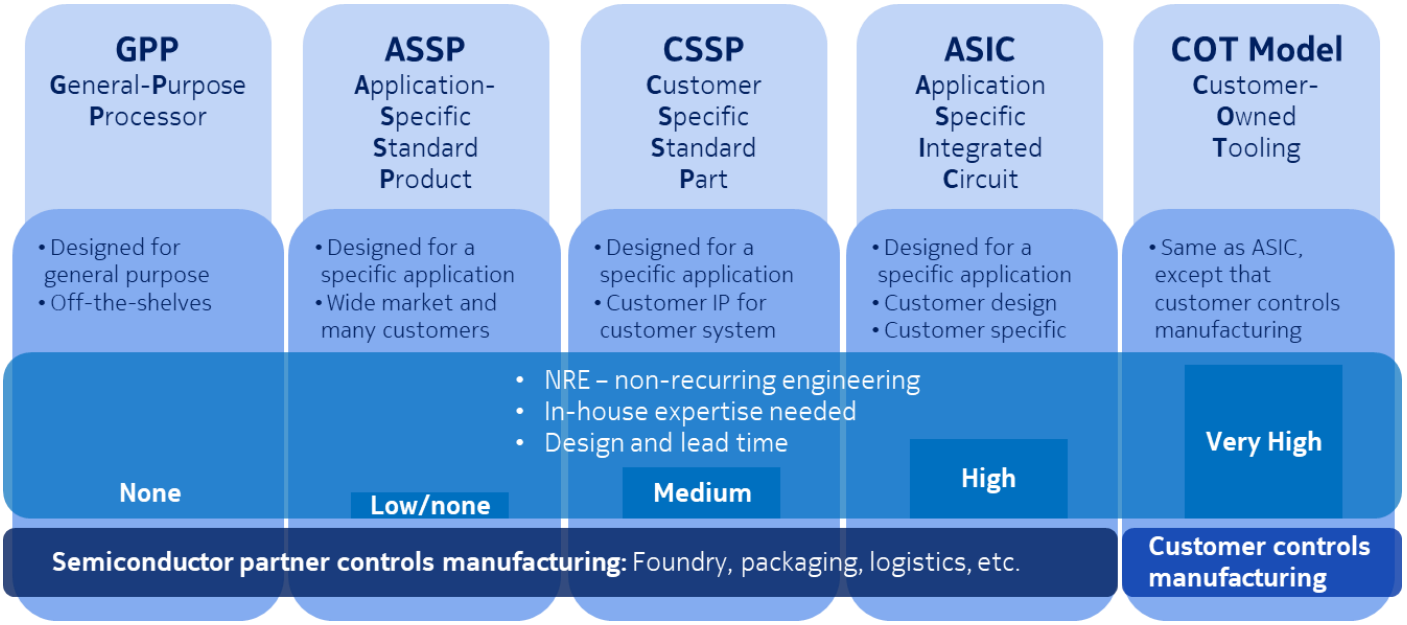
2 Leading-edge and custom chips

The EU must invest in beyond state-of-the-art technology. Leading-edge chips will continue to deliver better performance and bring energy efficiency gains in the years to come ("more Moore"). They are necessary to achieve technological avant-garde, including for the next generation of the telecom infrastructure. The smaller the technology nodes, the more functionality can be integrated into the chip. With every new generation of chips, the power consumption was reduced

© 2022 Nokia

on average by 50%. At the same time, now is the time to assure European readiness for “beyond Moore” including options of III-V technologies[1] and silicon photonics.

Sophisticated applications require dedicated chips to comply with extreme requirements of performance in dimensions of throughput, latency and energy efficiency. A producer developing a smart product needs to make a choice between general purpose processors (GPP/CPU), application specific standard products, customer specific standard parts, field programmable gate arrays or a custom chip specific for that market and that application. This choice defines level of dependency on third parties and the supply chain of these chips.



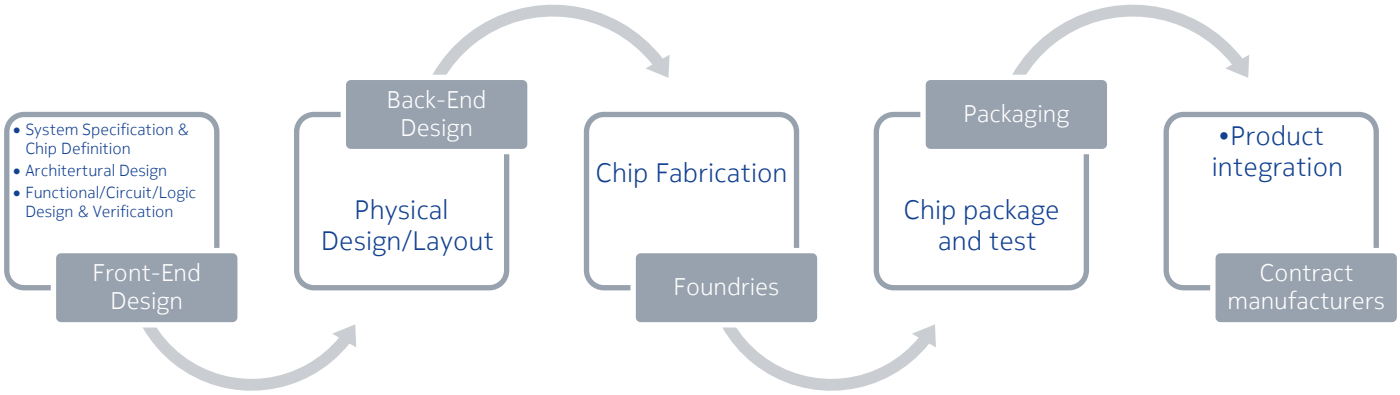
For demanding use cases such as Layer 1 radio access or AI/ML, custom chips (ASICs) will continue to be the approach of choice to allow best performance, feature set, energy efficiency, and product cost. Policy makers must recognize the fact that the most advanced chips are developed for specific application.

[1] Semiconductor III–V refers to materials, such as InP, InAs, GaAs, GaN, and InSb.

© 2022 Nokia

3 Strategic importance of chip design

The chip value chain is complex. The development cycle - from an idea to an integrated product - involves many distinct phases, with different industry players supporting them with varying degrees of vertical integration. In the case of state-of-the-art SoCs[2] such cycles can take 18 months and longer.



Technological sovereignty needs to rely on secured access to all steps in the chain which is not equal to localization of the full chips value chain in Europe. Instead, Europe should focus on growing its excellence in selected most promising and strategic segments.

Europe's ambition should be to strengthen chips design capacity, enabling more in house development by European industrial players (frontend and backend). Investing in European chip design is necessary to grow European chips expertise and ecosystem and secure future European demand for the potential foundry. In a fabless approach, a complete control over chip design would improve system security and enable use of alternative manufacturers improving Europe's strategic autonomy.

We welcome that the Chips Act foresees support for design. This should go further, for instance through programs to lower the costs associated with the development of chips such as access to tool(chain), prototype build, IP blocks for instance through strengthening nascent alternative players and tools and closer collaboration with the universities. Non-recurring engineering (NRE) costs are going up significantly for each new silicon technology node. Currently huge costs of access to IPR and the amount of required NRE to develop on those stifle potential innovation of smaller players. Facilitated access to chip protypes could ignite innovation and more design activities. The proposal mentions RISC-V which is potentially interesting but open source is not necessarily the most viable and appropriate option for all development needs. Policy should be fostering the development of a tools ecosystem to support design and the production of chips. The market will naturally drive towards the best ecosystem. Attention should also be placed on backend activities, as Europe has virtually no capacity in this domain. Enabling more backend activities would cut dependency on foreign players.

[2] SoC: system-on-a-chip; a complete processing system contained in a single package; containing multiple processing parts, memory, modems, and other elements; soldered onto the circuit board.

© 2022 Nokia

Equally skills and expertise are needed to grow European chips design. We encourage policy action in support of growing the talent pipeline, for instance through more college courses in Electrical Design and related fields and closer collaboration between the industry and academia.

4 Fabrication

Industry welcomes actions to add capacity and diversification of possible choices for chips fabrication. However, EU-localised foundries would not be cheaper than e.g. Taiwan-based with an advantage of required scale and demand. The EU needs to consider viability of the investment considering whether there is an outlook for sufficient demand to justify a new foundry. For the most advanced chips, it is not clear whether a foundry in Europe can secure constant orders to keep high utilization rate of the capacity. To make local manufacturing of leading-edge chips cost effective with necessary volumes, policy intervention should focus on lowering the upfront cost and more local advanced design to stimulate usage, as explained in the previous chapter. Further, we encourage to consider demand-side support to create business case. It could take a form of discount vouchers for European industry to utilize the foundry to make it viable, at least in initial period. Finally, a new foundry would ideally equally serve markets outside Europe, which further highlights the need to collaborate with international partners.

5 Chips for the Fourth Industrial Revolution

The EU needs to pick strategic areas to secure global leadership, to be a go-to place for those.

Telecommunication technology enables digital transformation of all other sectors; it is a precondition for connected/autonomous driving, smart grids, e-health. Telecommunications-enabled industrial digitalization will have a transformational impact on productivity, it will drive energy efficiency, it will enhance quality of life in safer, healthier and more sustainable communities. Telecommunication technology is needed to deliver on the twin challenges of ecological and digital transitions. Connectivity solutions provide economic and societal advantages; they also are in central attention for national security. As such it is the critical infrastructure of the 21st century.

As elaborated in the COREnect_Industry_Roadmap[3], Europe should have an ambition to play a leading role in future connectivity technology development. Even if Europe does not own today the complete connectivity value chain, Europe has strong assets to build on. Europe has an extraordinary advantage in hosting incumbent leaders in the telecom infrastructure and with them strong telecom R&D including SoC development.

Other countries already provide significant state-aid for firms developing chips for future new telecommunications infrastructure to encourage the emergence of national champions. It is important to match the support to maintain European leadership in telecom chips. IP design for the telecommunication infrastructure must be in prime focus the Chips Act support actions.

[3] COREnect_D3.6_Final_COREnect_Industry_Roadmap.pdf (squarespace.com)

© 2022 Nokia

Nokia praises the EU for taking steps to reinforce European strengths in microelectronics and in connectivity with Important Project of Common European Interest (IPCEI) on Microelectronics and Communications. It is urgent to start activities under IPCEI without delay, for the credibility of other policy interventions.

6 Security of supplies

Nokia purchases semiconductor products and integrated circuits for use in various telecommunications products, including the radiofrequency (RF) and Baseband of base station products, Customer Premise Equipment (CPE), Wi-Fi, Routing and Optical networking equipment. Telco industry requires a wide range of microchips including specific ASICs and SoCs in the 10nm range and below, leading-edge processors, Wi-Fi and Radio Frequency chips, SDRAM memory and others. Naturally, there is broad overlap with the demand of other high-tech sectors. As such Nokia was not immune to the effects of the global chips shortage. A response to the chips shortage to alleviate the situation needs to be multifaceted targeting all potential choke points starting at a level of substrates and constrained wafer supply. Of note, the number of scale providers of essential substrates is small and geographically limited. Similarly, the number of packaging firms that provide this essential step in the chip process are limited, geographically concentrated, and face over booking far into the future. This combined with inadequate supply of processing nodes in fabrication plants has created a multi-level strain on the supply chain. Industry receiving chips is faced with very long lead times and supplier decommits. Back-end assembly and testing could be a choke point too, due to their limited capacity and geographic concentration of this process. Most of the assembly and testing facilities are currently located in South East Asia (Malaysia, Taiwan and the Philippines).

7 Shortage Toolbox

Given a strain on the chips supply as described in the previous chapter, it is welcome that the Chips Act introduces a toolbox to intervene in a crisis. Any policy intervention should stem from a good understanding of the supply chain. Nokia supports creation of a mechanism to gather information about the supply situation and an early alert system. While doing so, a confidentiality of information needs to be secured to ensure cooperation with companies. Also, companies need one central point for those exchanges rather than supplying potentially sensitive data to 27 national authorities.

It is only understandable that governments wish to reserve a possibility to request an exceptional support from chips facilities benefiting from EU's public money in delivering critical inputs for the EU's (economic) security. However, this needs to be a last resort measure, to be used only at times of major distortions and shortages. Such a prioritization request would need to be well considered for possible knock down effects on other critical needs, as several industries compete for the same capacity in the semiconductor supply chain. Production adjustments may take a couple of months before producing any results. In principle, well-functioning market delivers most optimal results.

Further, the Chips Act proposes a potential joint procurement and export control as other tools to respond to acute shortages. Both need to be seen with caution. Leading-edge chips are not a

© 2022 Nokia

commodity; as explained in section ”Leading Edge” above, the most demanding SoC solutions will continue to be application specific, or even designed for a specific use case. As such, it is hard to imagine how common procurement could work on behalf of several European players and how an issue of presumably insufficient supply would be solved by an EU institution. Regarding export control, policy makers need to take account of the global supply chain of chips. As an example, a European substrate may need to processed in Asia and there turned into a chip, in order to come back to Europe for European industry use. Limiting exports of substrates in this example would negatively impact availability of chips for the European industry.

8 International collaboration

Holding strategic assets and creating mutual dependencies with other (like-minded) economies might be a recipe for success rather than re-creating the capacity locally. The goal should be diversification and (mutual) reliance on trusted allies. Formation of the EU-US Trade and Technology Council, and strong partnership between the EU and Japan and Korea, as well as announced new dialogue with Taiwan, present a great opportunity to take a coordinated action and improve collective supply chain resilience, leveraging respective strengths of partners.

Public support for growing capacity in the semiconductor ecosystem by both the EU and US and other international partners is very timely. Like-minded partners should try to coordinate responses to shortages and to jointly deliver necessary capacity with a goal of collective supply chain resilience. Mutual dependencies among reliable partners should be accepted. International coordination with trusted partners should fill the gaps, increase capacity and create diversification along the full supply chain (substrates, packaging and testing, fabrication). Desired outcome should be enough capacity at all levels of supply chain among trusted partners.

9 Beyond chips

For Europe’s strategic autonomy and tech sovereignty, secured access to other electronic components – such as PCB or RF filters – matters too. These components are less in a spotlight. However, their production is geographically concentrated with few viable options available to industry to diversify its supply chain (including for costs reasons). Given that those components are less complex to produce, presumably they would also require less elaborated programs to incentivize growing diversification in their supply. We recommend policy makers to take those components into account too.

Contact:
Julia Jasinska, Head of International Relation & Strategic Advocacy, Nokia
julia.jasinska@nokia.com

© 2022 Nokia