CENTER FOR DEFENSE REFORMS


REPORT

# KOMETA CRPA MANUFACTURING IN RUSSIA:

## STRUCTURE, COOPERATION, KEY FIGURES

# SUMMARY


- The Kometa Controlled Reception Pattern Antenna (CRPA) is a radio-electronic device for stable reception of satellite navigation signals. It is integrated into Russian weapons, including missiles, Shahed/Geran UAVs, and aerial bombs with UMPC/UMPB modules.
- The installation of Kometa on Shahed/Geran is seen as one of the factors increasing the effectiveness of massive attacks to exhaust Ukrainian air defence. Jamming-resistant navigation also enhances the Russian Federation's ability to use glide bombs from distant frontiers, complicating the defence of frontline cities.
- The Kometa CRPA is developed and manufactured by JSC VNIIR-Progress, which has several divisions in different cities of the Russian Federation. Based on a combination of publicly available information, the main site for the manufacture of satellite navigation antenna systems is the production base in Cheboksary.
- Signs of expansion in production have been identified: the creation of VNIIR-Progress SPb in St. Petersburg with a planned launch in 2028 and public signals about the preparation of a branch in Yoshkar-Ola.
- **Key figures at VNIIR-Progress JSC have been identified:**
  - Nenad Popovich – the actual owner of the ABS Elektro holding company, Minister of the Government of the Republic of Serbia responsible for international economic relations, who creates conditions for establishing international contacts in the interests of his Russian defence business.
  - Irina Kharisova – the hub of practical corporate and financial management. She heads the board of directors of ABS Electro and the board of directors of VNIIR-Progress JSC, and also manages companies founded by Popovich. Separately, Kharisova is the owner and CEO of Moseng Asset Management LLC, a structure that manages Popovich's shares on a trust basis.
  - Vladislav Kostin – responsible for the operational management of JSC VNIIR-Progress (contracts, production, personnel, etc.) and control over affiliated legal entities.
  - Vladimir Kharisov – a former military scientist; at JSC VNIIR-Progress, he is responsible for organising and managing design work. The Moscow scientific and technical centre he has established acts as the technical driver of Kometa and ensures its improvement.

- Kometa is structurally composed of printed circuit boards; critical serial production operations depend on a network of external contractors and suppliers.
- It has been established that in 2025, the key suppliers to VNIIR-Progress include Pantes LLC (St. Petersburg), PSB Technologies LLC (Moscow), AVIV LLC (Moscow), GIKel LLC (production processes are linked to a site in Voronezh), and electronic component supplier GetChips LLC.
- In the Pantes supply chain, a counterparty, Gran Group LLC, was identified as being involved in import deliveries, in particular with a link involving the Serbian companies Gigant 2019 d.o.o. and Barda d.o.o., as well as the Russian LLC Monkas (founded by a Serbian citizen).
- PSB Technologies is linked to foreign supply chains (in particular, Chinese and European distribution channels), including High Tech PCB Services Co., Ltd. Based on the evidence found, it may be linked to the Austrian company Ellwest PCB GmbH.
- Sanctions status: the most concentrated pressure has been recorded in relation to VNIIR-Progress and V. Kostin; sanctions regimes between jurisdictions are not synchronised; restrictions on some key individuals and suppliers are isolated or non-existent.

## OUR RECOMMENDATIONS

- Strengthen export controls and enforcement for printed circuit boards and related items, with a particular focus on HS group 8534 and items on the critical list.
- Apply targeted sanctions and restrictive measures to identified Russian contractors and suppliers in Kometa's supply chains, as well as to their associated managers and management structures.
- Exert diplomatic pressure on the Serbian authorities to remove the de facto representative of the Russian defence industry from the government.
- Strengthen financial monitoring and tracking of payments related to the procurement of wafers (components) and equipment for electronic manufacturing; expand the exchange of financial intelligence between jurisdictions.

# I. JAM-RESISTANT NAVIGATION IN RUSSIA: KOMETA AS A PRECISION WEAPON GUIDANCE TOOL

Since 2023, Ukrainian military specialists and forensic experts have regularly found satellite navigation signal reception modules known as Kometa in the wreckage of downed Russian air attack assets.[1, 2, 3] Their appearance in various classes of weapons indicates Russia's systematic reliance on jam-resistant satellite navigation as the basis for accurate guidance and correction.

**According to the Ukrainian open database War&Sanctions (Main Intelligence Directorate of the Ministry of Defence of Ukraine), Kometa navigation modules are used, inter alia:**

- in Iskander, Kalibr, Kh-69, Banderol and other missiles;
- in the interservice glide bomb UMPB D-30SN;
- in Shahed/Geran, Orion, Orlan-10 and Forpost UAVs, etc.[4]

In practice, this pushes Ukrainian defence towards a combined approach: along with the deployment of multi-layered air defence systems for the physical interception of attack weapons, the role of electronic warfare (EW) systems is growing. The latter are designed not only to «interfere» but also to systematically reduce the accuracy of satellite guidance and complicate combat use.

Kometa is an electronic device for stable reception of global navigation satellite system (GNSS) signals in conditions of interference.[5] **In open sources, it may be described by various terms:**

- small adaptive antenna array (Russian: «Малогабаритная адаптивная антенная решетка», MAAR) – in manufacturer's materials, patent data or procurement documentation; in English-language terminology, this corresponds to a CRPA antenna;[6, 7]
- digital antenna array (DAA) – in separate operating documentation.[8]

The presence of a common product designation (for example, «Kometa-M8» – ВУЦА.468166.055) indicates that this is the same product, and the difference in names reflects different emphases in the description (functional and design-documentation). In this investigation, the term Kometa CRPA is used throughout.

**According to the manufacturer, Kometa CRPA may be employed:**

- as an jam-protected antenna system for satellite navigation receiving equipment;
- as a fully functional jam-protected GNSS receiver;
- as a means of detecting interference affecting satellite radio-navigation signals.[9]

Specialist publications characterise Kometa as a substantive challenge for EW units, as its effective suppression requires simultaneous interference with several navigation frequencies

(seven or more for some modifications).[10, 11] In addition to jamming, other countermeasures are being considered, but they require more complex technological solutions.[12]

The installation of Kometa on Shahed/Geran is considered one of the factors that contributed to the scaling of attacks aimed at exhausting Ukrainian air defence.[13] RUSI analysts emphasise that suppressing UAVs' jam-resistant navigation systems requires specialised electronic warfare systems, which cannot be deployed in a continuous line. As a result, they have to be concentrated in priority areas, which potentially creates gaps in defence.[14] Jam-resistant navigation also expands the Russian Federation's capabilities in the use of glide bombs from remote frontiers, complicating the defence of frontline cities.[15]

In a broader sense, Kometa can be seen as one of the tools for maintaining weapon control in a «navigation war» (NavWar), where control of the navigation field and the ability to maintain accuracy in the face of interference become critical. European sanctions documents give additional weight to this topic, mentioning Kometa as an element of a military production programme rather than an abstract development.[16] That is why this study goes beyond a purely technical topic. We are talking about a tool that directly affects Russia's ability to scale up the combat use of drones, missile weapons and satellite-guided aviation munitions.

This OSINT investigation focuses on the organisational and production-logistical dimensions: who is the developer and manufacturer of Kometa, which legal entities and individuals play a key role in the development of this area, and what are the supply chains for components. The work uses data from open publications and official reports; information on import volumes and costs was obtained from publicly available customs databases.

# II. VNIIR-PROGRESS JSC: MANUFACTURER OF KOMETA CRPA AND COOPERATION CENTRE WITH THE RUSSIAN DEFENCE INDUSTRY

The Kometa was developed and manufactured by VNIIR-Progress JSC (Cheboksary), part of the ABS Electro group of companies.[17, 18] The company was established in the late 2000s as a subsidiary of VNIIR JSC, a powerful Soviet-era research organisation specialising in electrical switching and protection equipment, particularly for military applications. Since its inception, VNIIR-Progress has positioned itself as a contractor for military and special-purpose equipment, as well as a manufacturer of dual-use switching and protective equipment.[19] This is consistent with descriptions previously available on the corporate website (which was shut down in 2022 after Russia's full-scale invasion of Ukraine; currently, the content is being restored only through archive copies).[20] The list of customers and partners of the company included the Russian Ministry of Defence and a number of key Russian defence industry enterprises, in particular TsKB MT Rubin JSC, Concern VKO Almaz-Antey JSC, VPK NPO Mashinostroeniya JSC and others.[21]

The first public demonstration of Kometa CRPA was recorded in 2015 at the MAKS-2015 air show in the Moscow region. At that time, it was reported that VNIIR-Progress had reached an agreement on the use of Kometa products in UAVs manufactured by Finko LLC.[22] Given Finko's known ties to Unmanned Systems Group and the Supercam brand, it is highly likely that this referred to the integration of Kometa into one of the platforms in the Supercam line of reconnaissance UAVs.[23, 24, 25]

In August 2023, in an interview with the Rosinformburo news agency, the CEO of VNIIR-Progress said that against the backdrop of the so-called «SVO», the production of navigation products had outpaced other areas, and the production of «certain equipment» had increased more than a hundredfold.[26] The direct name of the product was not given, so the interview itself does not allow for unambiguous identification. At the same time, given the role of jam-resistant GNSS equipment in the war and known cases of Kometa's use in Russian models, the aforementioned growth probably concerns this product line.

**According to data for 2022-2023 available to the Centre for Defence Reforms (CDR), the buyers of VNIIR-Progress JSC products included manufacturers of UAVs and weapons, in particular:**

- **STC LLC**, a diversified company widely known as the manufacturer of Orlan UAVs; open sources mention the use of antenna arrays for navigation and jamming resistance in these devices.[27, 28] In January-September 2023, the company purchased VNIIR-Progress JSC products worth almost 795 million roubles (about $10 million);
- **TAIP LLC**, a developer of electronic equipment and microelectronics, manufacturer of the Phoenix UAV.[29, 30] A Kometa-M navigation module was found in a downed aircraft of this type in Ukraine.[31] In April-September 2023, the company purchased goods from VNIIR-Progress for a total of nearly 200 million rubles (about $2.5 million);
- **NPO IzhBS LLC** (associated with the Kalashnikov defence concern) – a manufacturer of dual-use unmanned aerial systems and guided munitions; among the most well-known products in the public domain are the Granat and Takhion UAVs.[32] The latter was spotted in the war against Ukraine; a Kometa-M module was found in the wreckage of the downed aircraft. In January-August 2023, NPO IzhBS purchased products from VNIIR-Progress for almost 69 million roubles (approximately $858,000);
- **Tactical Missiles Corporation JSC** – a manufacturer of missile weapons and related systems, including guided air-delivered munitions and guidance and correction kits (modules) for unguided bombs.[33, 34] This class of products is characterised by the use of satellite navigation; Kometa is mentioned in open sources as one of the components that increases jamming resistance.[35, 36] In April-June 2023, the company purchased products worth 166 million roubles (approximately $2.1 million).

No convincing evidence has been found in open sources of the existence in the Russian Federation of another serial manufacturer of products similar to Kometa CRPA in terms of the set of features that appear in public descriptions and application cases. Therefore, it is logical to assume that VNIIR-Progress will continue to supply military-industrial complex integrators in 2024-2025. An indirect indication of continued cooperation can be seen in reports of negotiations between VNIIR-Progress management and representatives of the defence industry at military-technical forums (in particular, ARMY). Potential contractors mentioned included Tactical Missiles Corporation JSC, NPO IzhBS LLC, NPO Kurganpribor JSC.[37]

For the sake of completeness, it should be noted that in the interests of the Russian military-industrial complex, VNIIR-Progress also supplies electrical products for switching, controlling and protecting electrical circuits in the power supply systems of various military platforms. In particular, a series of military-standard electrical switches is used in the construction of Yasen-M project submarines – multi-purpose nuclear submarines armed with cruise missiles.[38] As of January 2025, according to open data, five such boats had been built, and the overall plans envisaged the construction of ten.[39]


*At the Army 2023 forum, VNIIR-Progress JSC was awarded for its contribution to the development of weapons, military and special equipment*

In August 2024, in an interview with the publication National Defence, the CEO of VNIIR-Progress stated that the company's equipment is also used in tanks and combat vehicles, including the T-90M, T-72B3, T-14 Armata, BMPT Terminator, BREM-1M and others. Separately, the company's participation in production cooperation on the S-300V, S-400 and S-500 anti-aircraft missile systems, as well as a number of radar and radio navigation complexes was noted.[40] In the same context, it was reported that VNIIR-Progress equipment was used in a number of aircraft, in particular, on Su-24, Su-33, Su-34 military aircraft, Orlan-10, Orion and other unmanned aerial vehicles, as well as in planning and correction modules for unguided bombs (UMPK).[41, 42]

# III. STRUCTURE AND SITES OF VNIIR-PROGRESS JSC

**THE MAIN SITE OF VNIIR-PROGRESS JSC** is located on the VNIIR JSC premises in Cheboksary (Chuvashia). On the available evidence, the Cheboksary site appears to be the main production base for satellite navigation antenna systems and for electrical and electronic equipment.[43]

*VNIIR-Progress production site.* ***Photo: oborona.ru***

An article in the magazine «National Defence» contains a photo showing part of the VNIIR-Progress JSC production facility. Based on the characteristic details of the panorama outside the window, this facility is likely located on the rear side of the right wing of the main building of VNIIR JSC.

In addition, two branches of VNIIR-Progress JSC are listed in public company-register databases.

**THE MOSCOW BRANCH** of the company appears in public registries as a division of the company located at: 29 Serebryanitskaya Embankment, Moscow.[44] The Moscow office of the ABS Electro group, as well as ABS Electro CJSC, is listed at the same address in public registries.[45, 46]

According to open sources, the Moscow branch of VNIIR-Progress JSC is involved in R&D on navigation and communication systems, with a focus on improving jamming resistance in satellite-signal reception.[47] Public materials directly link at least one specialised structure to this branch – the Department of Navigation and Communication Systems, whose director is listed as Vladimir Nazarenko.[48]

Available publications and patent data indicate that this particular unit was directly involved in the development and improvement of Kometa CRPA.[49, 50] In particular, in August 2012, its team conducted field tests of the antenna array. The report states that the use of Kometa demonstrated jamming resistance at a level of 47 dB, implying that suppression would require roughly 50,000 times more power than for conventional GLONASS/GPS receivers.[51]

Separately, employees who are mentioned in open sources in the context of the branch's activities also appear in the Russian Federation utility model patent RU 124517 U1 «Compact adaptive antenna array» (application dated 7 August 2012).[52] In addition, in February 2019, the management and employees of the department responsible for the development of Kometa CRPA were nominated for a Russian Federation state award in the field of technology and weapons development.[53]

**THE ST. PETERSBURG BRANCH** of VNIIR-Progress is registered in an office building at 18 Bogatyrsky Prospekt, Building 1, Lit. A, where it occupies ten units.[54] The production base is located nearby, in an industrial complex at 18 Bogatyrsky Prospekt, Building 4 (structures 4, 7, 11 and 13).[55, 56]

According to open sources, this site manufactures marine electrical equipment: main and emergency power distribution boards and devices, starting and control equipment, uninterruptible power supply systems and other electrical equipment for the fleet.[57] According to the certificate of own production (April 2025), the production process uses 11 units of equipment for engraving, laser and CNC machining, as well as for cutting and bending metal busbars.[58] Specialised Russian resources name the St. Petersburg branch as one of the largest developers and manufacturers of low-voltage electrical distribution boards and ship automation systems for military and civil shipbuilding.[59]

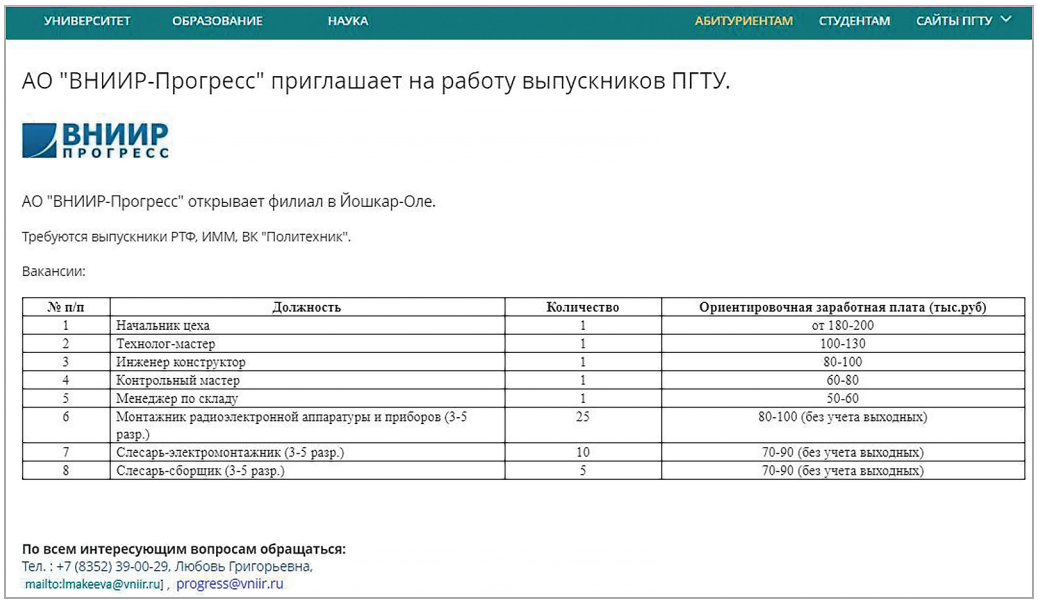
The finished products of this branch are likely the result of the assembly and integration of components manufactured at the Cheboksary facilities of VNIIR-Progress JSC. This is consistent with the fact that the branch is part of the company's unified production structure.

In January 2023, the St. Petersburg branch was visited by Vice Admiral Igor Mukhametshin, Deputy Commander-in-Chief of the Russian Navy. The purpose of the visit was to familiarise himself in detail with the process of developing and manufacturing products for ships and vessels of the Russian Navy.[60] Alexander Kozlov is listed as the head of the branch in open data.[61]

In April 2025, **VNIIR-Progress SPb JSC** was established in St. Petersburg on the territory of the Special Economic Zone (SEZ) «St. Petersburg».[62, 63] This is a new separate legal entity, not

a reorganisation of the St. Petersburg branch of VNIIR-Progress JSC. This is evidenced by the fact that the branch continues to operate and is still publicly referred to as a branch, i.e. it exists in parallel with the new JSC.[64, 65]

According to public reports, as part of the agreements between VNIIR-Progress JSC and the St. Petersburg government, a plant for the production of electronic products is to be built in the zone. The declared parameters of the project are: a 2-hectare site, investments of 5 billion roubles and a staff of about 200 people.[66] The page of the Vice-Governor of St. Petersburg, Kirill Polyakov, states that jam-resistant receivers and other electrical equipment will be produced.[67] The SEZ page and local media report plans to produce jam-resistant receivers for navigation satellite signals, printed circuit boards (PCB), and special and marine electrical equipment.[68, 69] Production is expected to begin in 2028, but these dates should be considered tentative and subject to change during implementation.



УНИВЕРСИТЕТ ОБРАЗОВАНИЕ НАУКА АБИТУРИЕНТАМ СТУДЕНТАМ САЙТЫ ПГТУ

АО "ВНИИР-Прогресс" приглашает на работу выпускников ПГТУ.

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|---|---|---|---|
| 1 | Начальник цеха | 1 | от 180-200 |
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| 3 | Инженер конструктор | 1 | 80-100 |
| 4 | Контрольный мастер | 1 | 60-80 |
| 5 | Менеджер по складу | 1 | 50-60 |
| 6 | Монтажник радиоэлектронной аппаратуры и приборов (3-5 разр.) | 25 | 80-100 (без учета выходных) |
| 7 | Слесарь-электромонтажник (3-5 разр.) | 10 | 70-90 (без учета выходных) |
| 8 | Слесарь-сборщик (3-5 разр.) | 5 | 70-90 (без учета выходных) |

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*Screenshot from the website of the university in Yoshkar-Ola with a list of vacancies for the future branch.*
***Date of publication: 10 July 2024***

There are also signs of possible plans by VNIIR-Progress JSC to launch **production in Yoshkar-Ola**, the capital of the Republic of Mari El, which borders Chuvashia. The company itself has not reported such intentions in open sources. At the same time, publications from July and August 2024 about preparations for the opening of a VNIIR-Progress branch and a list of vacancies have been found on the resources of the Volga State Technological University (Volgatech, Yoshkar-Ola).[70,71] In particular, these materials mentioned the need to recruit 45 employees in management, engineering and labour positions.[72]

The combination of publicly available information indicates that VNIIR-Progress JSC has a distributed structure: the main site in Cheboksary is supplemented by specialised regional branches. The Moscow division probably performs research, design and engineering functions in the field of navigation and jamming resistance, while the St. Petersburg site appears to be a production and integration centre for marine electrical engineering.

There are separate signs of intentions to further expand production: the creation of a new legal entity, VNIIR-Progress SPb JSC, within the St. Petersburg SEZ, as well as external job advertisements describing the preparation of a branch in Yoshkar-Ola. If these plans are implemented, VNIIR-Progress's capacity for serial production of jam-resistant navigation solutions may increase.

In practical terms, this increases the likelihood of a higher prevalence of Kometa modules (or functionally similar systems) in new and modernised Russian weaponry.

# IV. VNIIR-PROGRESS IN THE STRUCTURE OF THE ABS ELECTRO HOLDING: INDICATIONS OF PRIORITY STATUS

The ABS Electro group of companies is positioned as an electrical engineering and power holding company that brings together manufacturing enterprises and institutes in the fields of relay protection, automation, electrical engineering products, navigation and communication equipment, as well as design and procurement. In its own materials, the group emphasises the presence of «full-cycle enterprises,» including the production of electronic components.

The group's geography covers its head office in Moscow and production sites in Cheboksary and St. Petersburg.[74] The official website of ABS Electro lists the group's key entities, including VNIIR JSC and VNIIR-Progress JSC.In general, the list of companies associated with ABS Electro is broader, but the complete structure of the group is not the subject of this study.

The special place of VNIIR-Progress JSC in the group's structure is evidenced by a financing arrangement agreed within ABS Electro in January 2021 with the participation of VTB Bank and another company in the group, ABS ZEiM Automation JSC. Under the terms of the agreement, ABS ZEiM Automation acted as guarantor for VNIIR-Progress's obligations in the amount of up to 1.5 billion roubles (approximately $20 million).[75] Although public documents do not disclose the specific transactions for which the guarantees were issued, instruments of this scale are usually used to secure large long-term contracts or contracts with significant advance payments. For the guarantor, the risk was exceptional: the amount of the obligations was equal to almost 96% of the value of its assets at that time. The willingness of ABS Electro's management to take such a risk indicates the priority of VNIIR-Progress within the group's structure and may indirectly indicate the strategic nature of its activities for the Russian military-industrial complex.

Additionally, the priority of this asset is indicated by its financial results compared to other companies in the group. An analysis of the public financial indicators of the eight main manufacturing companies within ABS Electro shows that in 2021, VNIIR-Progress was one of the main sources of profit. It ranked second among the companies considered in terms of this indicator, second only to Relematika LLC. Since 2022, VNIIR-Progress's financial reports have not been published. At the same time, the company's products (in particular Kometa CRPA) are regularly mentioned in the context of their use in Russian weapon systems. This suggests that production capacity utilisation will remain high in the coming years.

Until 2023, VNIIR-Progress JSC was owned by VNIIR JSC. In July 2023, **Sokol Asset JSC**, established a few months earlier in April 2023, became the company's sole shareholder.[76] Public information on Sokol Asset's ownership is limited. However, a number of indirect signs indicate its involvement in ABS Electro: Sokol Asset's registered address (29 Serebryanitskaya Embankment, Moscow) coincides with the addresses of companies associated with the group and Nenad Popovic, and its contact email (info@mosenam.com) is linked to **Mosen Asset Management**. This structure provides fiduciary management and is owned and headed by Irina Kharisova.[77] The latter, in turn, is the chair of the board of directors of the ABS Electro group of companies.[78]

All these signs suggest that control over VNIIR-Progress after the change of formal ownership could have been organised not only through the publicly declared structure of the group, but also through a separate ownership and management circuit, within which legally different companies can de facto form a single decision-making system. At the same time, in the public materials of the ABS Electro group, VNIIR-Progress continues to be positioned as a component of the group.

The transfer of VNIIR-Progress to the control of Sokol Asset JSC led to a change in the route of potential profit redistribution (dividends, interest, intra-group transactions) to a new holding recipient. Sokol Asset's financial statements for 2024 show that this company does not engage in production or trading activities, but accumulates significant income from participation in other organisations, has significant financial investments and accounts receivable – characteristics typical of a transit or holding financial structure.[79]

At the same time, **Krokus Asset JSC** was established in 2023, whose owners are also not disclosed.[80] The shared address, contact details and management structure with Sokol Asset give reason to consider Krokus Asset as part of the same ownership and financial infrastructure. An analysis of Krokus Asset's financial statements indicates minimal economic activity and no signs of operational activity, which is consistent with its role as a technical legal structure.[81] Together, Sokol Asset and Krokus Asset form a package of non-public asset companies (asset management) with a shared administrative centre, where the former acts as an active financial hub and the latter as a reserve structure, potentially suitable for the further transfer of assets or corporate rights related to VNIIR-Progress JSC.

An additional indicator of centralised management is that in 2023, the management of VNIIR-Progress, as well as the related Sokol Asset and Krokus Asset, was concentrated in the hands of one CEO, Vladislav Kostin.[82]

The combination of these facts supports the conclusion that VNIIR-Progress is not a peripheral asset within ABS Electro, but one of the key elements of the group, around which a separate ownership, financial and management infrastructure has been built. This configuration may be a way to isolate the asset from sanctions risks and ensure manageability in a less public mode. In the context of Kometa's CRPA production, this reinforces the conclusion that VNIIR-Progress plays a systemic role in ensuring the capabilities of the Russian military-industrial complex, and that the relevant developments and production chains are considered by the Russian side to be an important element in the war against Ukraine.

# V. KEY PERSONS

This section outlines the key figures through whom the connection between the ownership and supervisory level of the ABS Electro group and the operational and technical management of VNIIR-Progress JSC can be traced. The focus is on examining the roles of these figures in creating conditions for the production and modernisation of Kometa CRPA under sanctions pressure.

**NENAD POPOVIC (NENAD POPOVIĆ)** is a Serbian politician and entrepreneur, president of the Serbian People's Party (SNP) and member of the National Assembly. In the official biography of the Serbian government, he is listed as former Minister of Innovation and Technological Development (2017–2022) and, as of January 2025, Minister without Portfolio, responsible for international economic


*Nenad Popovic is a Serbian politician and entrepreneur, president of the Serbian People's Party (SNP) and member of the National Assembly*

cooperation and the social situation of the church in the country and abroad.[83] Popovich consistently promotes Eurosceptic and anti-Western rhetoric and is one of the most pro-Russian figures in Serbian politics.[84] In 2014, he founded the Serbian People's Party (SNP), which some media outlets refer to as «the voice of Russia» on the Serbian political scene.[85, 86] The SNP acts as a coalition partner of the ruling Serbian Progressive Party (SNS) within the pro-government camp. In 2010, Popovich was awarded the Russian Order of Friendship.[87]

According to the Serbian investigative media outlet KRIK (2017), Popovich controls offshore companies registered in Cyprus and the British Virgin Islands, companies in Russia, and real estate in at least three countries.[88] Separately, KRIK's journalistic materials (in the context of the Paradise Papers) describe how, early in his career (1995–1996), Popovich worked in business structures associated with Marc Rich's trading company (Marc Rich & Co). In the 1980s, Marc Rich had a reputation for organising complex commodity schemes, including the supply of Soviet and Venezuelan oil to Cuba in exchange for sugar, despite the US embargo on trade with Cuba. In 1993, Marc Rich & Co was renamed Glencore, which the media associates with a controversial privatisation deal for 19.5% of Rosneft (2016) and discussions about the sources of funding for this transaction.

In this OSINT investigation, Popovich is considered a potential top-level owner and manager linked in open sources to the ABS Electro holding company and VNIIR-Progress JSC. A number of Russian open sources, including the official website of the ABS Electro group, directly link Popovich to the formation and control of the holding company.[89, 90] In December 2023, it was also reported that he had been awarded the honorary title of «Honoured Energy Worker of the Russian Federation» by decree of the President of the Russian Federation.[91]

According to open Russian corporate registers (aggregated extracts from the Unified State Register of Legal Entities), as of January 2026, **Nenad Popovic is directly listed as the sole founder of the following companies:**

- **Dominion Nikolski LLC** (rental and management of own or leased real estate); Popovich is listed as the founder (100%).[92]
- **Asset Electro LLC** and **Asset Automation LLC** (holding company activities); the CEO of both companies is Irina Kharisova.[93, 94] In 2024, these companies had profits in the form of dividend income of more than 2.7 billion roubles (approximately $30 million). In the US government's sanctions materials dated 16 November 2023, these structures are listed as the main holding links of Popovich's Russian business network in the electrical engineering sector of the Russian Federation.[95]

Excerpts from the Unified State Register of Legal Entities indicate that Nenad Popovic's shares in the aforementioned companies have been transferred to trust management, with Mosen Asset Management LLC listed as the trustee.[96] In a press release from the US Treasury Department, this company is referred to as the entity that manages Popovich's holdings. In addition, the list of controlled companies explicitly mentions VNIIR-Progress JSC, which Popovich controls through the aforementioned holdings and management infrastructure.[97]

A separate indicator of management ties is contained in a publication by the Serbian investigative media outlet KRIK. According to this material, Popovich settled the issue with the Serbian anti-corruption agency by providing documents on the transfer of control over his companies to Russian citizen Irina Kharisova. The jurisdiction and list of companies are not detailed in the publication.[98]

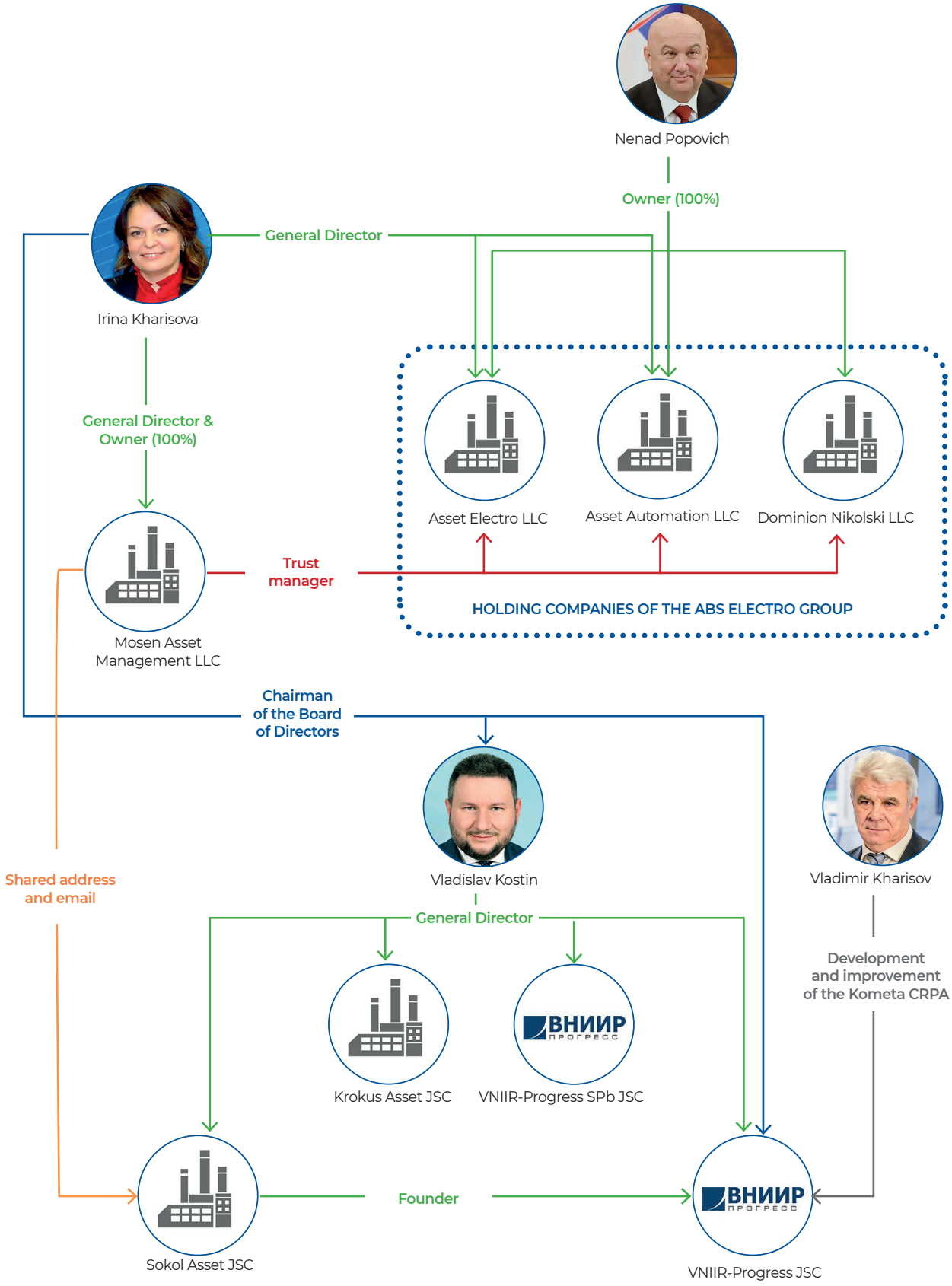
Popovich's public statements complement the description of his political and ideological proximity to the Russian Federation. The politician consistently promotes a pro-Russian and anti-Western political and ideological narrative. In particular, in 2017, he stated that «Crimea is Russian» and used the term «regime» to describe the government that allegedly came to power in Ukraine as a result of a «coup».[99] Later, in an interview with Russian media, he claimed that Serbia is proud of its historical and political brotherhood with Russia and will not impose sanctions against the Russian Federation.[100] In RUSI materials on Chinese-Russian interests in Serbia, Popovich is mentioned as a pro-Russian politician closely associated with the Russian Federation and focused on strengthening its influence.[101]

*Russian President Vladimir Putin visits Nenad Popovic's factory in Russia in 2014*

In open sources, Popovich also appears as one of the channels of economic communication between Serbia and the Russian Federation. It was reported that on the sidelines of the SPIEF-2025 forum (June 2025), he held meetings with Russian political and economic officials, including Sergey Lavrov, Dmitry Patrushev, and Deputy Chief of Staff of the Presidential Administration of the Russian Federation Maxim Oreshkin.[102, 103, 104] In the context of assets that include VNIIR-Progress, such communication could potentially create conditions for promoting the interests of controlled companies (access to financial instruments, institutional support, priority regimes, or reduced publicity of decisions under sanctions pressure).

Popovich's government status may provide him with access to high-level contacts and the business community during forums and international trips. His foreign visits and meetings with government and business representatives in 2024–2026 could potentially be more than just protocol events, but also create opportunities for establishing connections and promoting related commercial interests. Among the destinations recorded in 2025 are the UAE, Belarus and China.[105, 106, 107]

# FIGURE 1.
# CORPORATE LINKAGE NETWORK OF VNIIR-PROGRESS JSC



**IRINA KHARISOVA** is a key management figure within the ABS Electro structure, who should be regarded as a person with a mandate of trust from Nenad Popovic and a practical hub of corporate and financial asset management for the group, including VNIIR-Progress JSC.[108] According to public information, she has a long history with the group: since 2002, Kharisova has held financial positions at ABS Electro, ranging from specialist in the finance department to deputy finance director and finance director.[109] In later reports, she is mentioned as chair of the board of directors of ABS Electro (as of October 2025) and as chair of the board of directors of VNIIR-Progress JSC (June 2025).[110, 111]

According to open Russian corporate registers, Kharisova also appears as the head of a number of legal entities with a holding management profile, including ABS Rus JSC, AES JSC, Asset Electro LLC, and Asset Automation LLC.[112] Within the holding company, these companies form a separate management and financial level, which is used to manage corporate rights and property. Separately, she is the owner and CEO of Mosen Asset Management LLC, a structure that appears in a number of EGRUL extracts as a trustee managing corporate rights in companies where Nenad Popovic is listed as the founder.[113]

The episode involving Popovich transferring control of assets to Kharisova (described by KRIK) can be seen as a marker of delegated management. Given the presence of a separate management link in the ABS Electro structure (Sokol Asset, Mosen Asset Management), this gives reason to cautiously assume that a similar management model could have been applied to VNIIR-Progress JSC.

Taken together, the combination of roles in the holding links, the management company and the management bodies of VNIIR-Progress gives reason to consider Irina Kharisova as a key figure in the management of assets formally linked to Popovich.

*Irina Kharisova and Vice Governor of St. Petersburg Kirill Polyakov sign an agreement on the location of the new VNIIR-Progress production facility.* ***Photo: ABS Electro***

An additional marker of her real role as a representative of the circuit is her participation in the public registration of the VNIIR-Progress investment project in St. Petersburg: according to reports in the regional business press, the cooperation agreement between the St. Petersburg government and VNIIR-Progress JSC on new production in the St. Petersburg SEZ was signed by Irina Kharisova.[114] This reinforces the conclusion that she acts not only as an internal financial manager, but also as a public representative of key decisions related to the development of VNIIR-Progress.

**VLADISLAV KOSTIN** has served as CEO of VNIIR-Progress JSC since March 2023 (according to registration data) and holds the position as of January 2026. At the same time, he heads a number of related legal entities: Sokol Asset JSC, Krokus Asset JSC, and VNIIR-Progress SPb JSC.[115] In 2021–2023, Kostin also managed VNIIR JSC – at a time when VNIIR-Progress was still considered part of this structure.[116] This indicates a concentration of management of key assets and related corporate links in one set of hands.

As CEO of VNIIR-Progress, Kostin is responsible for the day-to-day operational management of the company, while the strategic and supervisory level is provided by the board of directors headed by Irina Kharisova.

In public, Kostin is presented as the «face» of the enterprise: he represents the company at industry events and communicates through the media[117, 118, 119] In a corporate interview (late 2021), Kostin himself called himself a «hereditary energy specialist» and emphasised his more than 10 years of work in the VNIIR group. This characterises him as a person who grew up within ABS Electro, rather than an external hired manager. Since 2024, Kostin has been under sanctions imposed by the US, the EU, Switzerland and a number of other jurisdictions.

As a result, Vladislav Kostin combines operational management of VNIIR-Progress, management of related structures, and the role of public representative of the company. At the same time, Kostin and Kharisova regularly appear together at institutional events involving VNIIR-Progress (signing agreements, launching projects, receiving official guests).[120, 121, 122] This is consistent with the division of roles, where Kharisova represents the ownership and supervisory level, while Kostin acts as the executive manager with constant risk of sanctions.

**VLADIMIR KHARISOV** is the director of the navigation and communication systems department, which operates as part of the VNIIR-Progress JSC branch in Moscow.[124, 125] Kharisov is a Doctor of Technical Sciences and a professor; the Russian media position him as one of the leading experts in the field of radio and satellite navigation.[126] It is separately noted that he is the winner of the 2012 award in the nomination «For contribution to the creation and development of the GLONASS system».[127]

There is no direct evidence in open sources to suggest that Kharisov is the sole author of Kometa's CRPA key technical solutions. At the same time, a combination of factors points to his involvement in the development and his role as project

manager: together with employees of the department he heads, Kharisov is listed among the authors of the Kometa CRPA patent and is also mentioned in materials where Kometa developers are recognised at the state level.[128, 129] In 2022, Vladimir Kharisov was awarded the medal «For Achievements in the Development of Innovative Technologies»; the award announcements mention developments in the field of defence, including Kometa.[130]

An indirect indicator that Kharisov and his department are continuing to work on improving Kometa is the discovery by Ukrainian specialists of modernised versions of CRPA in downed air attack vehicles. While early versions are described as compact solutions with four antenna array elements, the wreckage identifies improved versions (in particular, 12- and 16-channel).[131, 132, 133, 134] This is consistent with the logic of the current adaptation of the product to counter electronic warfare and installation on various carriers. However, no facts linking specific Kometa modifications found to the work of the Moscow department have been found in open sources. Kharisov himself regularly participates in public events related to antenna arrays; in particular, his participation in events in 2024 is mentioned, where issues related to the use of Kometa and signal processing by antenna arrays were discussed.[135, 136]

In biographical references, Kharisov is described as a career military officer (colonel) and is associated with the Zhukovsky Air Force Engineering Academy (VVIA) in the past: from 1994 to 2002, he held the position of head of the department of automated radio navigation and communication systems.[137] During his service, he co-authored numerous inventions and patents.[138] According to available data, he joined VNIIR-Progress during the formation (reorganisation) of the company in 2011.[139]

To strengthen the department, Kharisov brought in colleagues from the Higher Military Aviation Academy (VVIA). In particular, Ashot Oganesyan (associate professor of the Department of Radio Navigation and Radio Communications at VVIA) appears at VNIIR-Progress as deputy head of the department and among the candidates for the state award for the development of Kometa CRPA.[140, 141, 142] Valery Yefimenko is also mentioned among the developers: at the Higher Military Aviation Academy, he is a professor in the Department of Automated Radio Navigation and Communications Systems, and at VNIIR-Progress, he is the head of the R&D department. He led the development of satellite radio navigation signal processing algorithms, and his name appears among the authors of patents related to Kometa CRPA.[143, 144, 145, 146]

The presence of such a team partly explains the rapid results of the department's work on the Kometa CRPA project: as early as August 2012, the completion of antenna array testing and the registration of intellectual property rights were recorded.[147, 148] Open sources also suggest that Kometa CRPA was based on the experience of specialists from the VVIA scientific school.[149]

There is a hypothesis that Vladimir Kharisov may be the father of Irina Vladimirovna Kharisova. An initial OSINT search revealed that both individuals have the same registered address in Moscow, which is an indirect indication of a possible close relationship. At the same time, no official confirmation of kinship has been found in the public domain, so this connection remains hypothetical. In 2011, Irina Kharisova was listed as a member of the board of directors of VNIIR-Progress in corporate documents.[150, 151] Within the framework of the hypothesis and given Kharisova's trusting relationship with Nenad Popovic, she could have contributed to the organisational and personnel formation of the department.

These facts partly explain the appearance of radio engineering products in the GNSS and electronic warfare sectors among the products of ABS Electro, widely known for its electrical engineering activities. The further development of Kometa may be the result of the activities of a specialised Moscow scientific and technical centre within the structure of VNIIR-Progress, with the involvement of personnel from the military scientific school.

*Celebration of the 30th anniversary of the ABS Electro holding company. The placement of N. Popovich, I. Kharisova, V. Kharisov and V. Kostin in the front row in places of honour can be seen as a sign of the importance of these individuals within the holding company and an emphasis on the key role of VNIIR-Progress JSC in the group's structure.* ***Photo ABS Electro***

In addition to research and development work, Vladimir Kharisov is also involved in entrepreneurial activities – he is the founder of Falcon JSC (Cheboksary).[152] This company is registered at the same location where VNIIR-Progress and VNIIR operate. Its stated activity is the development of computer software; the company's financial indicators show losses. Falcon, in turn, is listed among the founders of Relematika-NKU LLC and VNIIR Technosoft LLC.

# VI. SUPPLY OF COMPONENTS: DIRECT IMPORTS, INTERMEDIARIES AND RUSSIAN SUBCONTRACTORS

## IMPORT DELIVERIES

In 2022–2023, electronic components for Kometa CRPA production were supplied to VNIIR-Progress via imports, both directly and indirectly via VNIIR JSC. This is confirmed by an analysis of VNIIR JSC imports: along with the typical range of electrical engineering products, electronic components characteristic of electronic products, including Kometa CRPA, are recorded there.

According to customs data, from December 2022 to January 2024, VNIIR-Progress made 73 import shipments worth $17.2 million. The nomenclature included electronic components and cable and connector products: microchips (including processors) from Analog Devices, Altera, and MACOM Technology Solutions, satellite navigation receiver parts from SAMTEC and Taoglas, telecommunications equipment modules, insulated cables and conductors (including coaxial and connector cables), etc. Products from Western manufacturers were supplied through intermediaries registered in China, India, Armenia, and Turkey, including Xiefeng (HK) Int'l Electronics Limited (Hong Kong), Si2 Microsystems Pvt Ltd (India), Element Int'l Forwarding Logistic Ltd (Turkey), and EC Energy LLC (Armenia). Some of the imported components were found in Russian weapons as part of Kometa CRPA.[153, 154]

With the participation of VNIIR JSC, 14 customs entries with a total value of $1.6 million were recorded between February 2023 and October 2024. Four companies were involved in the supply: Xiefeng (HK) Int'l Electronics Limited and Online Chip Electronic Co Limited (Hong Kong), Element Int'l Forwarding Logistic Ltd (Turkey), and EC Energy LLC (Armenia). The nomenclature was based on electronic components: integrated circuits and microprocessors from Analog Devices and Altera, as well as radio navigation receivers (NVS Technologies AG). Separate batches included computing units and antenna components.

## PRINTED CIRCUIT BOARD MANUFACTURERS

According to the 2025 Russian tax database, which CDR has at its disposal, the key contractors supplying components for the production of Kometa CRPA are the Russian companies Pantes LLC (St. Petersburg), PCB Technology LLC (Moscow) and Aviv LLC (Moscow). Their activities are related to the production of electronic printed circuit boards (PCB), which correlates with the technical descriptions of the Kometa family of products.

The Kometa CRPA  patent description states that the small antenna array is housed in a sealed enclosure containing a double-sided board with electronic components: antenna-emitting elements on the upper side and digital and analogue components on the lower side.[155]

Additional confirmation of the product's platform-based design is provided by a bill of materials for the **Kometa-M CRPA** (as of late 2024), held by the Centre for Defence Reforms (CDR). **According to it, the product includes, in particular:**

- main  board (base module) VUCA.468166.051-02 – 1 pc.
- VUCA.758745.001 board – 1 pc.
- MF30060V1-1000U-G99 fan – 1 unit.
- U.FL-2LPHF6-088N1T-AC-(100) cable assembly – 4 pcs.
- ISD2-07-D-M connector – 1 pc.

The official Kometa-M8 operating manual (later modification) also describes the product as an electronic module consisting of a carrier board with an antenna and mounting elements to which boards with other electronic components and connectors are mounted.[156]

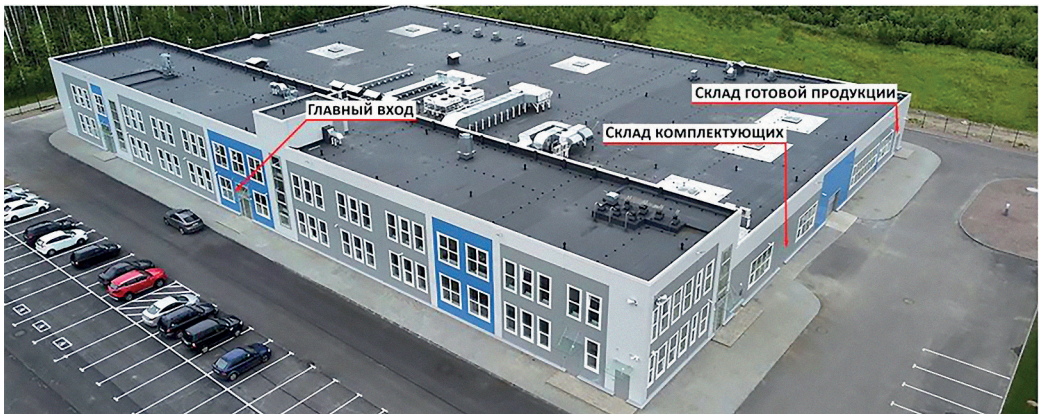
Taken together, the data provided indicates a production model in which the main operations for manufacturing Kometa CRPA components are performed by contractors specialising in PCB. Meanwhile, VNIIR-Progress JSC provides final assembly of the product, as well as design support and the formulation of technical requirements and orders for contract manufacturing of boards.

## PANTES LLC

The company specialises in the design, manufacture and assembly of printed circuit boards, in particular those that can be used in automated control systems and satellite navigation systems.[157] The company operates on an electronics manufacturing services (EMS), manufacturing products according to the customer's technical specifications.[158] In some public assessments, Pantes is ranked among the top 10 contract electronics manufacturers in the Russian Federation, but there is no official confirmation of this rating in open sources.[159] The company is the successor to Pantes Group LLC, which was liquidated in August 2022.

According to War&Sanctions, Pantes supplies VNIIR-PROGRESS JSC with modules for the production of Kometa antennas.[160] The same information is provided by an investigation by NAKO (Independent Anti-Corruption Commission, Ukrainian NGO), and additional confirmation of this is contained in information from the Russian tax database for 2025.[161]

Pantes' production facilities are located in the St. Petersburg Special Economic Zone (Novo-Orlovskaya site).[162] Since August 2022, an electronics manufacturing plant has been operating at this location.[163]




*Pantes LLC building on the territory of the St. Petersburg SEZ.*
***Photo pantes.ru***

In December 2024, Russian media reported on the start of construction of the second phase of the Pantes plant on the same site; the declared investment volume is 1.5 billion roubles.[164] The developer named in public announcements is the affiliated Pantes MT LLC.[165] The project involves the construction of a 5-storey production and storage complex with an area of 16,000 square metres on a 1.9-hectare site.[166] The same site, Novo-Orlovskaya, is planned to house the production facilities of VNIIR-Progress SPb JSC: according to the SEZ, commissioning is expected in Q4 2027; public announcements also mention a launch date in 2028.[167, 168]

As of 14 October 2024, the owners of Pantes LLC were NPF Torex LLC (97%) and Igor Korshunov (3%).[169] Subsequently, information about the owners was concealed on the basis of a decision by the Federal Tax Service (FTS) of Russia dated 22 October 2024. However, some sources contain information about the current owners as «1 legal entity, 1 individual».[170]

The contact details on the official website of NPF Torex contain the address St. Petersburg, Irynovsky Prospekt, 2 and the telephone number +7 (812) 740-71-98.[171] The same details are provided by Russian online directories and Yandex Maps for the Pantes LLC office.[172, 173, 174] The aforementioned Yandex Maps page contains reviews of Pantes dated June 2025.[175]

NPF Torex positions itself as a manufacturer of electronic equipment, in particular printed circuit boards.[176, 177] The website and company profiles on other resources explicitly state that the company has its own production facilities. Relevant photographs of equipment and production premises are published in the section on production facilities on the website. However, no separate address for the production site is provided. A visual comparison of these images with materials from Pantes LLC reveals an identical set of equipment and interior elements (despite different shooting angles).[178, 179] This allows us to state with a high degree of confidence that both companies are showing the same production site, which is indicated in Pantes' materials as being located in the St. Petersburg SEZ (the Novo-Orlovskaya site).

The above facts regarding NPF Torex LLC and Pantes LLC allow us to conclude that there is a stable connection between the companies, and the enterprises themselves probably remain affiliated even after concealing information about their owners.

According to information available to the CDR (data array for 2022–2023), in June–September 2023, NPF Torex made deliveries to Taip LLC worth almost 102 million roubles (approximately $1.0–1.5 million).

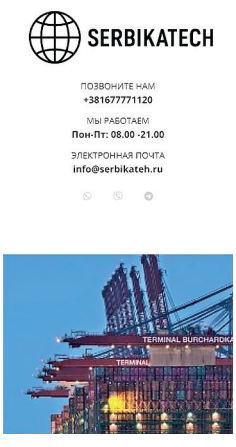
Open customs databases contain no records of Pantes LLC importing goods of foreign origin. According to data available to CDR, the company purchased goods through Russian intermediaries. The main items purchased were batches of electronic components, mainly integrated circuits, semiconductors and multilayer boards. High-tech equipment was also imported to support the industrial manufacturing cycle of complex electronics and the production of printed circuit boards (assembly lines, furnaces, X-ray and optical inspection systems, etc.).

According to internal CDR data, Pantes' suppliers include Russian contractors such as Gran Group Limited and NPP PKS LLC (this investigation only lists those for which imports were recorded in 2024–2025).

**GRAN GROUP LIMITED** is a Russian manufacturer of printed circuit boards that belonged to the Swedish NCAB Group prior to Russia's full-scale invasion of Ukraine.[180, 181, 182] According to customs data, in 2024–2025, the company imported, among other things, electronic products worth $18.7 million. More than 80% of this volume ($15.5 million) consisted of Chinese-made printed circuit boards without mounted electronic components. The customs records list companies from China and Hong Kong as suppliers, as well as Serbian companies Gigant 2019 d.o.o. (Beograd Novi Beograd), Barda d.o.o. (Novi Sad) and GLP d.o.o. (Novi Sad). The total volume of supplies from these three Serbian companies amounted to $14 million.

Gigant 2019 d.o.o. shipped $7.5 million worth of printed circuit boards to Gran Group either directly or through logistics intermediaries. Barda d.o.o. shipped nearly 7 tonnes of printed circuit boards worth $441,510 from Chinese manufacturers Shanghai Fast-PCB Circuit Technology Co., ltd and Ganzhou Beyond SCI-Tech Co., ltd to Gran Group Limited (the sole recipient).

Gigant 2019 and Barda d.o.o. are likely to be operationally related: both companies use the same phone number and focus on projects in Kyrgyzstan.[183, 184] In addition, both companies' websites are linked to the Bardacolor brand showcase website.[185, 186]




The aforementioned telephone number also appeared on the website serbikatech.ru, which was positioned as an «anti-sanctions service» offering services for the export/import/transit of goods to Russia.[187] The supply route described on the website involved circumventing sanctions «by legal means» and exporting from the EU to the Russian Federation via a warehouse in Serbia. The domain serbikatech.ru was registered on 25 April 2025, but as of 25 January 2026, the resource was unavailable.[188] An archived view of the page has been preserved on addcatalogs.manyweb.ru, a website promotion and domain review service. Separately, on Telegram, you can find a page for contacting serbikatech.[189] The situation with this site may indicate an attempt by the management of Gigant 2019 (Barda) to organise an additional supply channel to Russia. However, for unknown reasons, these plans were not implemented or postponed to another time.

Checking the archived versions of the Gigant 2019 website (domain g2019.rs) showed that in May 2024, the feedback icon was linked to the Telegram account @MoncasaLLC. A search for this name leads to the Russian company Monkasa LLC.[190] From its founding in 2007 until the end of 2022, this company specialised in selling food products from Spain.[191] In December 2022, Monkasa changed owners – it became Yekaterina Dazhuk.[192] The company now positions itself as a trading and logistics company specialising in the sale and supply of goods from the EU and China. In May 2023, Monkasa began importing from Gigant 2019 and a number of other companies that supplied on behalf of Gigant 2019. By the end of March 2025, products worth almost $20 million had been imported, mainly trucks (up to 5 tonnes), climate control and ventilation equipment (air conditioners/heat pumps and centrifugal fans), industrial equipment and components, as well as electronic components and cable products. In addition, Monkasa repeatedly appears as an import customer: deliveries were made to Gran Group Limited with the note «on behalf of Monkasa LLC» (the exporter was Gigant 2019 d.o.o).

**NPP PKS LLC** is a manufacturer of enclosures and modular frames for mounting boards and electronic modules.[193, 194] The company is a manufacturing division of the Spectr group of companies, which specialises in the production of embedded computer systems, electrical equipment and uninterruptible power supply systems.[195] The parent company of the group is Spectr RC LLC.[196]

According to customs data, NPP PKS imported products worth $95,840 in 2024–2025. The range of supplies includes enclosures (parts of enclosures) for electrical equipment, as well as cables, connectors, contacts and other components. The suppliers are Chinese companies Tianjin Delv Intelligent Equipment Manufacturing Co., LTD and AAA China Limited, as well as Hong Kong traders HK Exponent Trade Limited and HK Impactrade Limited, acting on behalf of Kyrgyz legal entities Boruchok LLS and Ailana KG LLC.

### PCB TECHNOLOGY LLC

A Russian company specialising in the development and manufacture of printed circuit boards, as well as contract manufacturing of electronics.[197] According to the Dossier Centre, PCB Technology is included in the closed register of defence enterprises of the Russian Ministry of Industry and Trade, which are the main contractors for state defence orders, contractors and suppliers to the Russian military-industrial complex.[198] The company also appears as a recipient of state support.[199]

According to a NAKO investigation, the company supplies components for enterprises that produce UMPC (unified planning and correction module) – a kit that converts unguided aerial bombs into guided munitions thanks to wings and a GPS/GLONASS guidance system. The same investigation states that the company supplies VNIIR-Progress JSC with modules for the assembly of small Kometa-M grids; the use of imported equipment from the United Kingdom is specifically mentioned.[200] Ukrainian intelligence (War&Sanctions) also reports on the company's involvement in the production and supply of components for Kometa-M.[201] This is supported by data from the Russian tax database for 2025.

PCB Technology's office is located in Moscow at 26B Bolshaya Poshtovaya Street, Building 2, Office 406. The company does not disclose the address of its production facilities. The contact details on the website only mention the finished product warehouse at 125 Varshavskoye Shosse, Building 3, Moscow. However, an analysis of job advertisements, materials from the «Virtual 3D Tour of the Production Facility» and videos about the receipt of new equipment strongly suggests that production processes take place at this same address.[203, 204, 205]

In May 2025, PCB Technology acquired 3,785 square metres of space and became a resident of the Ostafyevo Innovation and Import Substitution Centre technology park (Novomoskovsky Administrative District of Moscow). According to reports, the company plans to expand its manufacturing and engineering capacity. As of January 2026, the facility's card on the city portal «Stroiki Moskvy» has the status «Under construction».[207]

Two other companies are linked to PCB Technology through their common founders: **PCB Technology SPb LLC**[208] and **KB Skhematika LLC**[209]. The former operates in St. Petersburg and, based on a combination of factors, functions as the St. Petersburg branch of the Moscow-based company.[210] This is indicated by the stated main activity and shared website: PCB Technology is listed as the head office in the contacts, and the St. Petersburg address on the same website is listed as PCB Technology, not PCB Technology SPb.[211, 212] According to information available to CDR (data array for 2022–2023), in January–June 2023, PCB Technology SPb supplied products to STC (manufacturer of Orlan UAVs) worth 1,875,694 roubles (approximately $24,300). KB Skhematika specialises in the design of printed circuit boards; on the PCB Technology website, it is listed as a subsidiary of.[213]

According to customs data, in 2024-2025, PCB Technology LLC carried out 74 import operations worth almost $2.2 million. 95% of imports were printed circuit boards without mounted electronic components, and their total weight exceeded 14 tonnes. This product (HS 8534001100) is included in the Common High Priority Items List, a list of products that are critical to the Russian army.[214]

**The largest suppliers (totalling $2.1 million) were:**

- Iditarod Logistics Shenzhen Limited (China): 26 deliveries worth $1,043,943; manufacturers – High Tech PCB Services Co., Ltd and Infinity Imports & Exports (Shenzhen) Ltd.
- High Tech PCB Services Co., Ltd: 38 deliveries of products listed as own production worth $1,080,923.

High-Tech PCB Services was founded in 2014 in Hong Kong.[215] A search of open sources yielded no results regarding its production capacities. This gives reason to position the company not as a «manufacturer» but as a service and trading operational structure in the supply chain. Additionally, High-Tech PCB Services is listed as the Quality Control & Logistics Office (China) on the website of another company, Ellwest PCB GmbH (Vienna, Austria). The location is listed as Shenzhen, China.[216] Ellwest (until 2015 – Ellwest KG) describes itself as a European distribution channel for a group of printed circuit board manufacturers with production sites in China, Taiwan and Bulgaria and its own office in Shenzhen.[217] The company also claims to have a «production base» in the form of a group of manufacturers in China and Taiwan.

Ellwest has long-standing business ties with PCB Technology. In 2002, the parties entered into a distribution agreement for the supply of printed circuit boards from South Korea to Russia.[218] The Austrian company is listed as a partner on the PCB Technology website.[219] From 2015 to 2019, Ellwest PCB GmbH was headed by Alexander Akulin, one of the owners of PCB Technology until 29 December 2022.[220]

### AVIV LLC

AVIV LLC is a Russian company engaged in the manufacture and assembly of printed circuit boards, the development of electronics, and the supply of electronic components.[221, 222] According to the Dossier Centre, Aviv is included in the list of Russian military-industrial

complex enterprises.[223] The company itself publicly declares that it carries out work in the interests of the Russian Ministry of Defence and regularly participates in the ARMY forums organised by this department.[224]

AVIV Group LLC operates in the same premises as AVIV LLC: both companies are linked through common founders and are part of the same group.[225] According to the Main Intelligence Directorate (War&Sanctions portal), AVIV Group supplies modules for the production of Kometa CRPA to VNIIR-Progress JSC. Additionally, NAKO materials describe AVIV Group LLC as a supplier of printed circuit boards to Russian defence industry enterprises, in particular to VNIIR-Progress JSC. It is noted that deliveries are carried out within the framework of cooperation on the assembly of small-sized Kometa-M antenna arrays using foreign equipment.

Data from the Russian tax database for 2025 lists AVIV LLC as a counterparty to VNIIR-Progress JSC in supply chains. In public materials, AVIV notes the presence of production facilities in Voronezh.[226, 227] This is most likely GIKel LLC, which is linked to AVIV through common founders and managers in public registers.[228] GIKel operates in Voronezh and positions itself as a manufacturer with expertise in the production and assembly of printed circuit boards and serial contract manufacturing.[229]

### GETCHIPS LLC

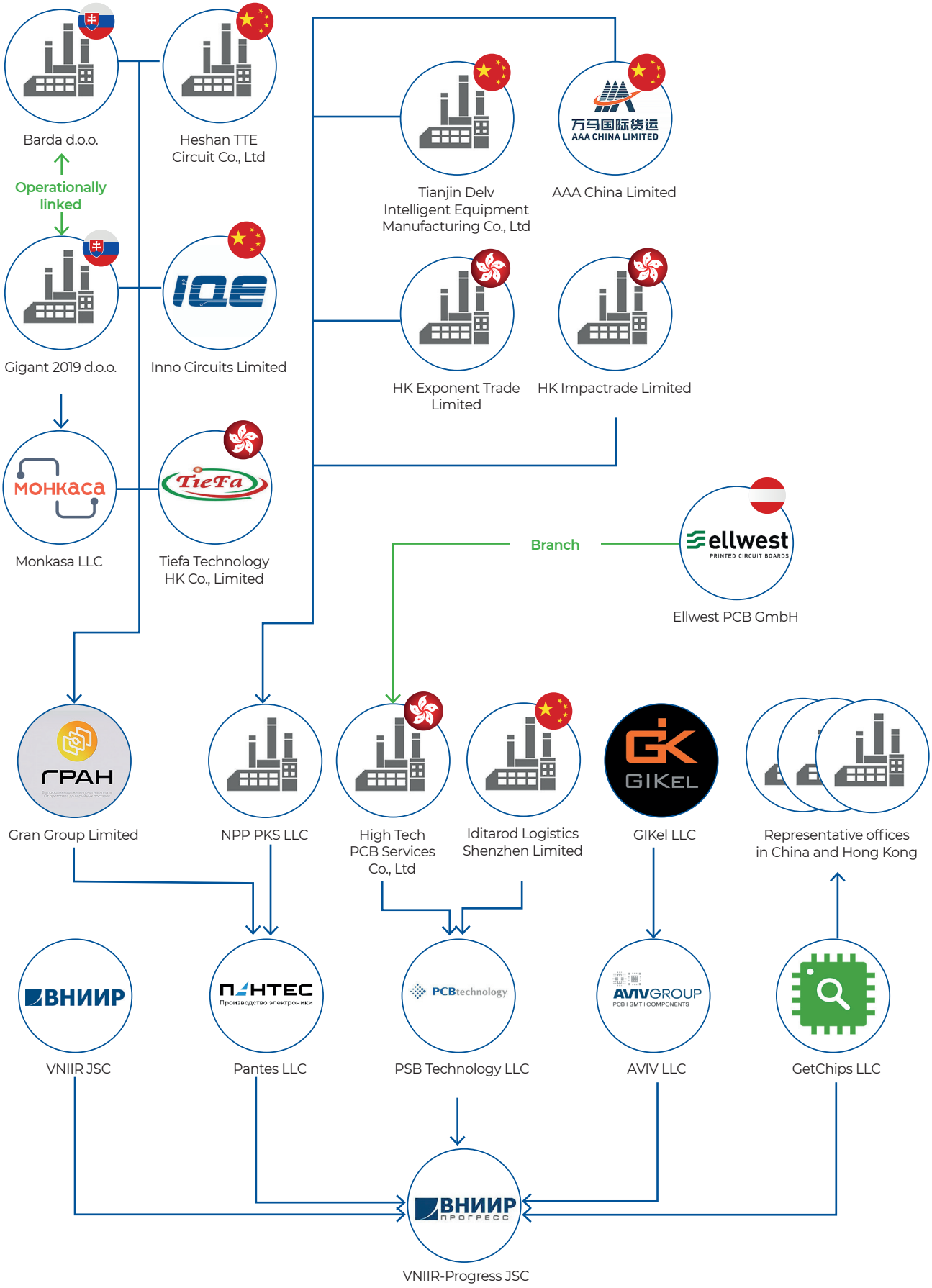
According to Russian tax records from 2025, GetChips LLC is also listed among the suppliers of VNIIR-Progress JSC.[230] The company is registered in Yekaterinburg and specialises in the supply of electronic components. In December 2024, Bloomberg described GetChips in its own investigation as one of the Russian online platforms through which Texas Instruments (USA) components were purchased. The supply chain involved the use of intermediaries in Hong Kong, and some of the orders were linked to companies that manufacture weapons for the Russian army.[231]

Until 2022, GetChips positioned itself as part of the Arvis Group, which claimed to be partnered with global distributors of electronic components.[232] During this period, Arvis LLC operated under the Arvis Group brand, and both companies were linked through common founders.[233, 234] In early 2022, GetChips announced a «merger» with Arvis Group (the announcement is currently available in the archive), but legally the companies continued to exist separately.[235] Presumably, this was not a merger of legal entities, but rather an integration at the level of an online sales platform: a joint showcase and mutual distribution of customer inquiries. This is consistent with the fact that arvisgroup.ru was redirected to GetChips.ru for some time.

In the context of operational activities, this configuration means that the «merger» could have worked as a consolidation of commercial functions without formal reorganisation. This created a single point of entry for orders, joint marketing, centralised order collection and further processing by one of the legal entities. Accordingly, externally it looks like a single point of sale, while the legal formalisation of contracts, invoices and deliveries could remain distributed between the two companies. This model could also increase flexibility in imports by spreading functions and counterparties between legal entities.

In a statement by the State Fund for the Development of Industry in the Ryazan Region, GetChips is described as one of the largest (top 10) distributors of electronic components and modules in Russia.[236] In 2021–2022, the company received an industry award in the nomination «Russian Distributors of Electronic Components».[237, 238] Since 2022, GetChips LLC has shown steady profit growth; in 2024, it reached 204.8 million roubles (approximately $2.21 million).

## FIGURE 2. SUPPLY NETWORK OF VNIIR-PROGRESS JSC



Until January 2022, the company reported having representative offices in Hong Kong and Shenzhen (China).[239] The current version of the website does not contain this information, but it can be found in other sources. In particular, a job advertisement for a customs control specialist posted in January 2026 on meec.com.ru mentions the presence of representative offices in Hong Kong and Shenzhen, as well as in Tashkent (Uzbekistan).[240]

# VII. SANCTIONS AGAINST THE VNIIR-PROGRESS ECOSYSTEM

The table below summarises the sanctions restrictions imposed on the organisational and management structure of VNIIR-Progress JSC, as the direct developer and manufacturer of Kometa CRPA, and the associated network of suppliers and contractors involved in component supply.

As can be seen from the data, the manufacturer and its CEO, Vladislav Kostin, are under the most intense sanctions pressure. At the same time, the sanctions regimes of different jurisdictions are not synchronised: some key figures in the related circuit are subject to restrictions only in certain countries or are not subject to sanctions at all. A similar asymmetry can be seen in the pair of Nenad Popovic and Irina Kharisova: Popovich is under US sanctions, while Kharisova is not. Vladimir Kharisov, who directly manages the development and improvement of Kometa, is also not under sanctions.

At the supplier level, restrictions are sporadic or non-existent. Such fragmentation of sanctions coverage does not provide a deterrent effect or the likelihood of a complete halt to component supply. Access to the electronic component base supports the continuity of Kometa CRPA production and, accordingly, contributes to preserving the Russian Federation's ability to improve the accuracy of missiles, UAVs, and guided aerial bombs.

| Subject | Field of activity | Sanctions |
|---|---|---|
| Nenad Popovic (TIN 773389222811), Serbia | Controls the ABS Electro holding company | United States |
| Irina Kharisova (TIN 771412568133), Russia | Key management figure in ABS Electro | Sanctions do not apply |
| Vladislav Kostin (TIN 772410397702), Russia | Chief Executive VNIIR-PROGRESS JSC | USA, EU, Switzerland, France, Belgium, Monaco, Ukraine |
| Vladimir Kharisov (TIN 771409047194), Russia | Director of the Department of Navigation and Communication Systems, VNIIR-Progress JSC | Sanctions do not apply |
| ABS Rus JSC (TIN 7709713406), Russia | Managing company of the ABS Electro holding | Sanctions do not apply |
| VNIIR-PROGRESS JSC (TIN 2130094170), Russia | Developer and manufacturer of small-sized adaptive antenna arrays Kometa | USA, Great Britain, EU, Belgium, Japan, Australia, France, Canada, Monaco, Switzerland, Ukraine |

| Subject | Field of activity | Sanctions |
|---|---|---|
| VNIIR-Progress SPb JSC (TIN 7814850673), Russia | Manufacture of navigation and electrical equipment | Sanctions do not apply |
| VNIIR JSC (TIN 2128001516), Russia | Manufacturer of electrical equipment, counterparty of VNIIR-PROGRESS JSC in supplies | United States |
| Sokol Asset JSC (TIN 9710112971), Russia | Asset management, parent company JSC VNIIR-Progress | Sanctions do not apply |
| Krokus Asset JSC (TIN 9710112587), Russia | Asset management | Sanctions do not apply |
| Mosen Asset Management LLC (TIN 2128056160), Russia | Trust management services | United States |
| Asset Electro LLC (TIN 7710911530), Russia | Activities of holding companies | United States |
| Falcon JSC (TIN 2130212810), Russia | Development of computer software | Sanctions do not apply |
| Pantes LLC (TIN 7839043576), Russia | Manufacture of printed cir-cuit boards | Ukraine |
| PCB Technology LLC (TIN 7722680051), Russia | Production of printed circuit boards | Ukraine |
| PCB Technology SPb (TIN 7841365242), Russia | Market research and public opinion surveys | Sanctions do not apply |
| KB Skhematika LLC (TIN 7714756652), Russia | Printed circuit board design | Sanctions do not apply |
| AVIV LLC (TIN 9721027220), Russia | Manufacture of printed circuit boards, supply of electronic components | Ukraine |
| GIKel LLC (TIN 3662995875), Russia | Manufacture of printed cir-cuit boards | United States |
| NPF Torex LLC (TIN 7825442718), Russia | Manufacturer of electronic equipment, including printed circuit boards | Sanctions do not apply |
| GetChips LLC (TIN 6658455625), Russia | Supplier of electronic components | Ukraine |
| Arvis LLC (TIN 6658385640), Russia | Supplier of electronic components | Sanctions do not apply |
| Monkasa LLC (TIN 7731582050), Russia | Supplier of electronic components | Sanctions do not apply |
| Gigant 2019 d.o.o. (PIB 111617436), Serbia | Supplier of printed circuit boards | Sanctions do not apply |

| Subject | Field of activity | Sanctions |
|---|---|---|
| Barda d.o.o. (PIB 108516386), Serbia | Supplier of printed circuit boards | Sanctions do not apply |
| High Tech PCB Services Co., Ltd (Registration No.: 2177154), Hong Kong | Supplier of printed circuit boards | Sanctions do not apply |
| Iditarod Logistics Shenzhen Limited (USCC 91440300691197083P), China | Supplier of printed circuit boards | Sanctions do not apply |

# VIII. CONCLUSIONS AND RECOMMENDATIONS

This investigation shows that the Kometa CRPA is an electronic device designed for robust reception of satellite navigation signals. Its widespread integration into Russian weapons mitigates accuracy loss in Russian missiles, Shahed-type UAVs and air-dropped bombs fitted with UMPK (UMPB) under Ukrainian EW jamming. Kometa is not a factor capable of radically changing the course of the war on its own, but it does allow weapons to remain controllable under electronic countermeasures.

This affects approaches to countering aerial threats: instead of simply «jamming» satellite signals, it is necessary to use more complex specialised electronic warfare systems, which cannot be deployed in a continuous line. As a result, gaps in EW coverage emerge are formed and the load on kinetic air defence increases. This increases the need for expensive air defence systems, which increases the risk of resource depletion.

It has been established that Kometa CRPA is developed and manufactured by VNIIR-Progress JSC (Cheboksary), part of the ABS Electro group. The company is a hub of cooperation: it develops technical solutions and production requirements, but the serial production of the product relies on a network of contractors and component suppliers. The Moscow branch of VNIIR-Progress JSC appears to be a research and development centre in the field of navigation and jamming resistance; publications, patents and personnel links connect it with the development of Kometa CRPA. In 2023, the company's management announced a sharp increase in the production of navigation products against the backdrop of the war. In addition, the company manufactures and supplies other electrical and electronic products for various military platforms and systems.

Additionally, there are signs of production expansion: the creation of a separate legal entity, VNIIR-Progress SPb JSC, and public indications that a branch is being prepared in Yoshkar-Ola. If implemented, this could increase serial production capacity for jam-resistant navigation solutions.

It has been established that within the ABS Electro group, VNIIR-Progress appears to be one of the key assets with high profitability indicators until 2022 (further financial reports are hidden). The management structure of VNIIR-Progress, which oversees the development of Kometa CRPA, is characterised by the concentration of key functions in the hands of a limited circle of individuals.

Serbian citizen Nenad Popovic is considered the top owner in this structure. His government status could potentially expand access to high-level contacts and business circles during international trips and forums. As of January 2026, Nenad Popovic is listed as the founder of several companies associated with the holding structure: Dominion Nikolski LLC (rental and management of owned or leased real estate), Asset Electro LLC and Asset Automation LLC (holding company activities). His shares in these companies have been transferred to trust management, with Mosen Asset Management LLC listed as the trustee.

The key figure in practical corporate and financial management is Irina Kharisova, the holding company's strategic decision-maker. She chairs the board of directors of ABS Electro and the board of directors of VNIIR-Progress JSC. She also manages a number of legal entities that perform holding asset management functions, including companies where Popovich is listed as the founder. Separately, Kharisova is the owner and CEO of Mosen Asset Management LLC, a structure that manages Popovich's shares in the aforementioned companies on a trust basis.

Vladislav Kostin is responsible for the operational management of VNIIR-Progress JSC (contracts, production, personnel, etc.) and control over affiliated legal entities.

Vladimir Kharisov and the Moscow scientific and technical centre he has formed play a separate role. They act as the technical driver of Kometa and ensure its improvement; together, the entire structure of VNIIR-Progress forms a stable model for product support and scaling.

The Kometa CRPA has a platform-based design, making printed circuit boards (PCBs) and electronic modules critical components for its serial production. Under these conditions, one of the main functions of VNIIR-Progress JSC is to develop technical solutions and production requirements, while a significant part of production operations is carried out by a network of external contractors and suppliers.

In 2022–2023, VNIIR-Progress received electronic components and interconnect products both via direct import channels and indirectly through VNIIR JSC. It has been established that in 2025 the key contractors in the component supply chains for Kometa were Russian companies whose profile aligns with the product's design and the need for serial PCB production and assembly: Pantes LLC (St. Petersburg), PCB Technology LLC (Moscow), AVIV LLC (Moscow), GIKel (Yekaterinburg), and GetChips LLC (a supplier of electronic components).

Pantes LLC is one of the main companies that, according to multiple sources, supports Kometa's CRPA production as a supplier of modules (boards) for VNIIR-Progress, with signs of capacity expansion. Among the company's suppliers is Gran Group Limited, which is involved in import supplies and is likely part of a chain that includes Serbian companies Gigant 2019 d.o.o. (Beograd Novi Beograd) and Barda d.o.o. (Novi Sad), as well as the Russian company Monkasa LLC, whose founder is a Serbian citizen.

Based on a combination of factors, PCB Technology is involved in the production and supply of components for Kometa-M. PCB Technology has been found to import significant volumes of printed circuit boards from China under HS code 8534001100, which is included in the Common High Priority Items List. Foreign supply chains (in particular from China and the European distribution channel) can be traced among the counterparties. In particular, High Tech PCB Services Co., Ltd, which is likely to be associated with Ellwest PCB GmbH (Vienna, Austria).

AVIV LLC is a Russian company whose activities are related to the manufacture and assembly of printed circuit boards and the development of electronics. It has been established that AVIV LLC's production facilities are likely to be linked to an affiliated site in Voronezh (in particular through GIKel LLC).

In view of the above, Kometa's CRPA production should be considered a networked process: production stability is ensured not only by the organisation of VNIIR-Progress, but also by access to boards, electronic components, assembly and test equipment, as well as logistics and payment infrastructure. The identified supply chains indicate the systematic use of intermediaries in several jurisdictions (in particular Hong Kong/China, Turkey, Armenia, Serbia), which is consistent with the practice of circumventing restrictions on the purchase of electronics. The vulnerabilities of this model are its dependence on import flows and technological support, its concentration on individual contractors, and its repetitive external supply links.

The analysis showed that VNIIR-Progress JSC, as a manufacturer, and its CEO Vladislav Kostin are under the most concentrated sanctions pressure in the Kometa CRPA management, supply and production ecosystem. At the same time, the sanctions regimes of different jurisdictions are not synchronised: some key figures are subject to restrictions only in certain countries or are not subject to sanctions at all. This is particularly evident in the case of Nenad Popovic and Irina Kharisova: Popovich is under US sanctions, while Kharisova is not; Vladimir Kharisov, who directly oversees the development and improvement of Kometa, also remains unsanctioned.

At the supplier level, restrictions are few and far between or non-existent. This fragmentation does not create a sufficient deterrent effect and does not guarantee a halt to component supply. With access to the electronic component base, this supports the continuity of Kometa CRPA production and, accordingly, preserves the Russian Federation's ability to maintain the capability of missiles, UAVs, and guided aerial bombs to strike under conditions of counteraction.

## OUR RECOMMENDATIONS BASED ON THE STUDY RESULTS:

1. Strengthen export controls and enforcement for printed circuit boards and related items, with a particular focus on HS group 8534 and items on the critical list.
2. Apply targeted sanctions and restrictive measures to identified Russian contractors and suppliers involved in Kometa's supply chains, as well as to their associated managers and management structures.
3. Strengthen financial monitoring and tracking of payments related to the procurement of boards (components) and equipment for electronic manufacturing; expand the exchange of financial intelligence between jurisdictions.
4. Prepare industry warnings for banks, insurance companies, freight forwarders and carriers regarding recurring intermediaries and logistics hubs that appear in shipments of boards to the Russian Federation, with requirements for increased verification.
5. Deploy systematic verification of European distribution channels and related offices in third jurisdictions to minimise indirect supply channels to the Russian Federation.

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