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| **Source:** | ITU-T Study Group 13 |
| **Title:** | LS/i on Establishment of new Focus Group on Artificial Intelligence Native for Telecommunication Networks (FG-AINN) [from ITU-T SG13] |
| **LIAISON STATEMENT** |
| **For action to:** | - |
| **For information to:** | 3GPP, ETSI, ITU-T SG2, SG3, SG5, SG9, SG11, SG12, SG15, SG16, SG17, SG20, TSAG |
| **Approval:** | ITU-T Study Group 13 meeting (Geneva, 22 July 2024) |
| **Deadline:** | N/A |
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A new liaison statement has been received from SG13.

This liaison statement follows and the original file can be downloaded from the ITU ftp server at <http://handle.itu.int/11.1002/ls/sp17-sg13-oLS-00191.docx>.

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|  | INTERNATIONAL TELECOMMUNICATION UNION**TELECOMMUNICATIONSTANDARDIZATION SECTOR**STUDY PERIOD 2022-2024 | **SG13-LS191** |
| STUDY GROUP 13 |
| Original: English |
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| **Source:** | ITU-T Study Group 13 |
| **Title:** | LS on Establishment of new Focus Group on Artificial Intelligence Native for Telecommunication Networks (FG-AINN) |
| **LIAISON STATEMENT** |
| **For action to:** | - |
| **For information to:** | TSAG, ITU-T SG2, SG3, SG5, SG9, SG11, SG12, SG15, SG16, SG17, SG20, 3GPP, ETSI |
| **Approval:** | **ITU-T Study Group 13 meeting (Geneva, 22 July 2024)** |
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| **Abstract:** | This Liaison Statement informs about the establishment of the new FG-AINN by ITU-T SG13 at its meeting on 22 July 2024. |

ITU-T SG13 is pleased to inform your Study Group/organization that it has agreed to establish under its mandate in accordance with Recommendation ITU-T A.7 a new Focus Group on Artificial Intelligence Native for Telecommunication Networks (FG-AINN).

The Focus Group will serve as an open platform for collaboration between experts in the ITU, other SDOs, industry, and academia, enabling a cross-pollination of the right talent, knowledge, and experience to address integration of new AI Native techniques in telecommunication networks. The FG-AINN will study the relevant AI Native techniques and the validation mechanisms for such techniques to enable AI Native Telecommunication networks.

The Focus Group lifetime is set for one year from the first meeting.

The first meeting of FG-AINN will be held after the WTSA-24.

Chair of the Focus Group is Ms Buse Bilgin (Turkcell, [Türkiye](https://www.itu.int/hub/membership/our-members/directory/?myitu-members-states=true&request=organisations&id=1000100436)). Vice-chairs are Mr Leon Wong (Rakuten Mobile, Japan), Mr Paul Harvey (University of Glasgow, UK) and Mr Gyu Myoung Lee (from Republic of Korea).

The Terms of Reference of the Focus Group are found in the annex 1.

SG13 appreciates your interest and collaboration on this topic.

Annex 1

## Terms of reference for the ITU-T Focus Group on Artificial Intelligence Native for Telecommunication Networks (FG-AINN)

**1 Rationale and scope**

As the telecommunication network evolves into a flexible, cloud-native implementation, AI/ML-based network optimization becomes crucial. An AI-aided method focuses on optimizing specific communication modules within the network, but it often falls short in handling data processing, data collection, and algorithm convergence efficiently.

Current implementations of AI/ML in telecommunications face limitations including siloed and fragmented deployments that hinder interoperability and holistic optimization. They struggle with scalability due to the high computational resources required and the challenges of managing vast amounts of data. Traditional AI models often lack adaptability, relying on static, supervised learning that doesn't quickly adjust to changing network conditions. Integration into existing network operations is complex and resource-intensive, and maintaining AI model performance over time is challenging. This limitation makes it hard to ensure optimal overall system performance, leading to the consideration of AI-native methods.

AI-native is described as “the pervasive use of AI and a required accompanying data infrastructure in all sub-components of an entity rather than adding on an AI-based component to an existing non-AI-based entity”. It refers to the integration of inherent, trustworthy AI capabilities within a system's design, deployment, operation, and maintenance, making AI a fundamental aspect of its functionality. This approach utilizes a data-driven and knowledge-based ecosystem, where data and knowledge are both consumed and generated to create new AI functionalities or to enhance and replace static, rule-based mechanisms with adaptive, learning AI as required. AI-native optimization transforms the entire network structure into an AI framework, replacing more modules or even entire communication layers, and solves inefficiencies by enabling adaptive optimization and end-to-end training for a more autonomous and efficient network. In essence, AI Native networks are designed to inherently understand and adapt to new use cases and trends, enabling more autonomous and user-focused network experiences. This is a shift from traditional network designs where AI functionalities are added on top of existing structures. The aim is to embed AI deeply into the network's architecture to drive innovation and efficiency in the network.

As shown in the table in clause A Table 1, compared to non-AI native approaches, some benefits of AI-native for telecommunication networks include:

- Rapid rollout of network optimizations

- Customization of network features and issue resolutions

- Scalability and adaptability to address new use cases

- Enhanced capability for risk mitigation in networks

- Enhanced data privacy and security in networks

- Uniform methods for enabling new use cases in networks

To prepare for adoption towards AI-native for telecommunication network, it is necessary to perform pre-standardization studies in preparation of future standardization efforts to be done in ITU-T. ITU-T SG13 encompasses numerous valuable studies for AI-aided networks, including ITU-T Y.3172 and ITU-T Y.3061, making it an ideal foundation for AI-native studies, as understanding AI-aided systems is essential for developing AI-native systems. Developing AI-native systems requires studying of novel AI frameworks tailored to address unique challenges, including dynamic adaptability, time criticality, intent management, resilience, nonlinear signal dynamics, and human-level cognition for intelligent decision making and efficient resource management. The group focuses on how AI-driven pipelines, background analysis, and complex inter-domain chains of AI pipelines can be used to discover and address use cases dynamically. It also highlights the need for use-case-specific fine-tuning of models and the design of network functions with AI. The proposed FG aims to do analysis of AI Native approaches needed with a specific focus on non-Radio aspects, along with a formal definition of AI Native.

Focus Group will consider the following problems:

1) Overlay/Underlay based approaches followed in ITU frameworks such as ITU-T Y.3172 and ITU-T Y.3061 is not sufficient to address the use cases mentioned in [1]. Hence AI Native approaches in telecommunication networks would need to be studied.

NOTE – no new AI model or AI algorithm or AI technology is proposed to be developed as part of the deliverable.

NOTE – The scope of analysis may include use cases for different types of networks. However, it is noted that use cases for existing networks such as IMT-2020 can be addressed by existing ITU frameworks such as ITU-T Y.3172. It is new use cases for example the ones defined in [1] which give rise to the need for new approaches such as AI Native. Hence the focus would be in upcoming use cases as against existing use cases. The scope of analysis does not include specific network architecture. The scope includes how to use AI Native approaches in a common, unified way to realize the new use cases, e.g. those mentioned in [1].

2) The requirements and architecture directions, key technical design characteristics for integration of AI Native approaches in networks are not clear. These requirements and impacts have to be studied in the context of a set of use cases.

3) To have a common understanding in the industry, academia and other stakeholders, it is important to define a common architecture framework of AI Native for telecommunication networks.

Focus Group will consider the following aspects for pre-standardization work related to AI Native approaches as technical enablers in networks:

* Gap analysis

A study of different activities in various standardization organisations and industry forums in this domain and a collection of guidelines and best practices, including a gap analysis and a pre-standardization roadmap is needed, while focusing on the non-radio part. The following aspects would be studied in this regard:

* Analysis of the technical, terminological, and principal gaps of the studies under ITU and other standardization bodies, industry bodies, open-source bodies;
* Develop a pre-standardization roadmap that leverages gap analysis to identify the necessary studies, tasks, and timelines required to bridge the gap between the current situation and the target objectives.
* Use cases and requirements

AI Native as a new architectural approach in telecommunication networks for the use cases identified in [1], with a specific focus on non-radio aspects is needed. This would form the basis of use cases for AI Native approaches in networks with a specific focus on non-radio aspects. The following aspects would be studied in this regard:

* + Common terminology, definitions and concepts related to AI Native.
	+ Use cases that benefits from the integration of AI Native approaches in telecommunication networks.
	+ Technical requirements of each use case, related to AI Native.
	+ Whether and how the various use cases can benefit from AI Native approaches.
* Architecture frameworks

A study is needed regarding the architecture directions of AI Native, while focusing on the non-radio part, along with the correspondingly relevant AI Native approaches themselves, and the integration and validation mechanisms for such approach. The following aspects would be studied in this regard:

* + Architecture frameworks and characteristics, including identification of various relevant AI Native approaches and their architectural requirements.
	+ Customisation and optimization techniques of various AI Native approaches useful to enable the different networks scenarios.
	+ What are the integration and validation techniques for the various AI Native approaches in relation with the various use cases.
* Collaboration:
	+ Knowledge dissemination activities such as workshops in collaboration or alignment with SG13, technical presentations and webinars,
	+ Joint study based on open call for collaboration with any interested parties on proof of concepts of relevant concepts or use cases (similar to FG-AN Build-a-thon).

NOTE: Gap analyses and collaboration activities are ongoing processes that will continue throughout the duration of the FG studies.

This Focus Group will study the native integration of AI in networks, with focus on non-radio aspects, building upon the previous work of ITU such as FG-ML5G and FG-AN.

The Focus Group will serve as an open platform for collaboration between experts in the ITU, other SDOs, industry, and academia, enabling a cross-pollination of the right talent, knowledge, and experience to address native integration of AI as a new architectural approach in networks. As demonstrated previously in FG-ML5G and FG-AN, a Focus Group’s capacity to bring together ITU members and non-members is invaluable to preform pre-standardisation, which can then be translated to meaningful input to the study groups. The focus group would be the right place to study and evaluate the latest AI Native approaches so that the use cases of networks can be realized.

**2 Objectives**

The Focus Group aim to support pre-standardisation activities, including the following objectives:

1. Objective-1: Analysis of gaps and study of use cases related to AI Native (focusing on non-radio aspects)
	1. To study terminology, concepts, use cases, gaps and technical requirements for AI Native networks.
	2. To identify and study the AI Native approaches for telecommunication networks, their evolution and key tasks for standardization purposes.
2. Objective-2: Study of architecture frameworks and technical enablers for AI Native (focusing on non-radio aspects)
	1. To identify possible architecture directions and common frameworks for integration of AI Native approaches in networks.
	2. To support customization, optimization and validation of AI native networks.
	3. To study and develop PoC design on feasibility and relevance of certain AI Native approaches in telecommunication networks.
3. Objective-3: Knowledge dissemination
	1. To build a community of experts and practitioners to unify the concepts, develop common understandings, so that it be benefiting not only the ITU standardization scene but also the global community.
	2. To identify stakeholders with whom ITU-T could collaborate and establish liaisons and relationships with other organisations that could contribute to the pre-standardisation activities and identify potential collective action and specific next steps.
	3. To collaborate with stakeholders to implement the PoC designs for studying the feasibility of certain concepts.

See clause A below for detailed list of concepts to be studied.

**3 Specific tasks and deliverables**

The Focus Group is expected to provide its deliverables to SG13 for its consideration and action, as appropriate (e.g., distribution of deliverables for consideration on starting new work items).

1. Technical reports on gap analysis:
	* To develop deliverables related to the gap analysis (focusing on non-radio aspects)
		+ gaps with respect to existing technologies and the studies under the standardisation organizations, industry bodies, and open-source bodies.

NOTE - Collated inputs received till the approval of the FG, including the supporting material discussed in the CG would be used as a starting point for gap analysis and use cases. In addition, the gap analysis would be updated as the FG progresses its work.

1. Technical reports on use cases:
	* To develop deliverables related to the use cases (focusing on non-radio aspects)
		+ terminology, definitions, use cases, requirements related to AI Native.
2. Technical specifications on architecture frameworks:
	* To develop deliverables related to architecture frameworks to enable the networks use cases [1] with AI Native approaches (focusing on non-radio aspects)
		+ frameworks for AI Native networks and enabling technologies.
		+ corresponding optimization techniques of AI in networks, their mapping to use cases in networks, management of AI Native for telecommunication networks.
		+ integration techniques and validation techniques for AI Native for telecommunication networks, their evolution and key tasks for standardization purposes.
3. Knowledge dissemination workshops:
	* To organize and participate in workshops, webinars, aligned with SG13 meetings, regional stakeholders, panel discussion to share and collect knowledge and experience from a wide range of expert community and stakeholders to create awareness about the works of the FG.
4. Final report: Upon completion of its lifetime, to provide the final report and remaining set of deliverables to SG13.

See clause B below for detailed list of tasks and deliverables to be studied.

**4 Relationships**

The Focus Group will work through regular meetings and arrange co-located meetings with ITU‑T SG13 when possible. It will establish and maintain task-appropriate collaboration arrangements with other partners as well.

The Focus Group will collaborate with standards bodies, open source, forums, consortia and other entities dealing with aspects of AI Native for telecommunication networks and liaise with organizations, which could contribute to the standardization activities for AI Native for telecommunication networks with a specific aim to understand the AI Native approaches, and the requirements for technical enablers (focusing on non-radio aspects).

The Focus Group will organize thematic workshops and forums on AI Native in telecommunication networks, which will bring together all stakeholders, and promote the FG activities, encouraging both ITU members and non-ITU members to jointly contribute to FG-AINN and its objectives.

Furthermore, the Focus Group will collaborate (as required) with other relevant groups and entities, in accordance with Recommendation ITU-T A.7. These include governments, non-governmental organizations (NGOs), policy makers, SDOs, industry forums and consortia, companies, academic institutions, research institutions and other relevant organizations. The Focus Group will provide a collaboration environment for collaborations and presentations to leading research groups and SDOs and stakeholders to present their research during the FG meetings, and will coordinate such relationships, liaison and collaborations.

**5 Structure**

The Focus Group may establish sub-groups if needed.

**6 Parent group**

The parent group of the Focus Group is SG13.

**7 Leadership**

See clause 2.3 of Recommendation ITU-T A.7.

**8 Participation**

See clause 3 of Recommendation ITU-T A.7. A list of participants will be maintained for reference purposes and reported to the parent group.

**9 Administrative support**

See clause 5 of Recommendation ITU-T A.7.

**10 General financing**

See clauses 4 and 10.2 of Recommendation ITU-T A.7.

**11 Meetings**

The Focus Group will conduct regular meetings which may be virtual. The frequency and locations of meetings will be determined by the Focus Group management. The overall meetings plan will be announced after the approval of the terms of reference. The Focus Group will use remote collaboration tools to the maximum extent.

The meeting dates will be announced by electronic means (e.g., e-mail and website, etc.) at least four weeks in advance.

**12 Technical contributions**

See clause 8 of Recommendation ITU-T A.7.

**13 Working language**

The working language is English.

**14 Approval of deliverables**

Approval of deliverables shall be taken by consensus.

**15 Working guidelines**

Working procedures shall follow the procedures of Rapporteur meetings. No additional working guidelines are defined.

**16 Progress reports**

See clause 11 of Recommendation ITU-T A.7.

**17 Announcement of Focus Group formation**

The formation of the Focus Group will be announced via TSB Circular to all ITU membership, via the ITU-T News log, press releases and other means, including communication with the other involved organizations.

**18 Milestones and duration of the Focus Group**

The Focus Group lifetime is 1 year, with possibility of extension.

Any extension beyond the above-mentioned date is subject to the decision by SG13, in line with ITU-T A.7.

**19 Patent policy**

See clause 9 of Recommendation ITU-T A.7.

## A. Detailed list of concepts to be studied

NOTE- Use cases, requirements, architecture framework may be studied based on the detailed list.

Specific PoC design may be done but execution of PoC may be based on ITU effort.

Key concepts to be developed by the proposed group:

1. **Key concept-1: Management of AI Native for telecommunication networks** (focusing on non-radio aspects)

Description:

Existing 5G network functions with ML pipeline integration are defined as in ITU-T Y.3172 to be managed by MLFO. However, management of AI Native for telecommunication networks, would need study.

Aims:

* + 1. Study In-network creation of AI models
		2. Study the management of the life-cycle of AI models given that they are natively integrated with the network functions themselves.
1. **Key concept-2: Study of AI Native approaches for network customizations** (focusing on non-radio aspects)

Description:

Network operators may be required to tune networks and services considering varying conditions, such as local user preferences or regional service requirements. These extensions and customizations not only add to the network complexity but also hinders automation. We propose to study the key concept of AI native for network customizations.

Networks are heterogeneous systems in time, space, and equipment. As a result, the use of un-customised “one-size-fits-all” AI technologies cannot be used across these different dimensions, yet networks must be able to support the use of AI for the network itself or to support verticals without requiring constant human effort.

Network support for AI Native customisation will study platform-based augmentation of the network to accommodate the necessary considerations related to how the network itself can support customisation of AI technologies for use and update across the different domains and dimensions of the network.

Aims:

* + 1. Study of “network contextual operation for AI” in order to inform the requirements for AI customisation across the network domains.
		2. Study the use cases of customisation for AI across the different domains of the network
		3. Study the implementation of new use cases and impacts to existing use cases, given the introduction of AI Native network functions (NF) and potential customization.
		4. Study how to integrate new requirements to existing NF.
		5. To report on the specification languages required to document and characterise such network customisation for a network context
		6. To report on the telemetry and control interfaces necessary from the network to support customisation
1. **Key concept-3: Study of dynamic composition of services** (focusing on non-radio aspects)

Description:

[2] talks about AI managed AI architecture. However here we are studying the support for AI-managed network architecture. E.g., How to add a new interface?

Aims:

* + 1. Study network impacts, including support for AI-managed, AI generated, network architecture frameworks and exposure of interfaces.
1. **Key concept-4: Study of trust in AI native for telecommunication networks** (focusing on non-radio aspects)

Description:

While AI-native network components bring in many advantages over the non-AI-native ones, such as reduced execution overhead, they also bring in certain degree of uncertainty and trust factors. In order to reduce this uncertainty, we need to address the trust issues in AI native for telecommunication networks.

Aims:

* + 1. Study factors which lead to uncertainty and lack of trust in AI native approaches.
		2. Propose practical solutions to reduce the uncertainty and increase the trust.

**Table 1 - Brief comparison of AI-native System and Non-AI-Native System**

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| **Characteristic** | **AI-Native System** | **Non-AI-Native System** |
| **Core Design Philosophy** | AI is a fundamental component of the system's design and architecture. It is deeply ingrained in the system's core. | AI is not a primary consideration in the original design and architecture. It may be an afterthought or an added feature. |
| **Integration Level** | AI is seamlessly integrated into virtually all aspects of the system, affecting its core operations and functions. | AI integration is often modular, focusing on specific components or tasks, which may or may not interact harmoniously with the rest of the system. |
| **Optimization for AI** | The system is fully optimized to harness the power of AI, with hardware, software, and algorithms fine-tuned for AI-related tasks. | Optimization for AI may be limited due to retrofitting AI capabilities into an existing framework, leading to potential inefficiencies. |
| **Scope and Pervasiveness** | AI pervades numerous functions, features, and user interactions, making it an integral part of the user experience. | AI's influence is limited to specific use cases or functionalities and may not have a significant impact on the overall user experience. |
| **Data Handling** | AI-native systems are often capable of handling and processing large volumes of data efficiently, which is essential for complex AI tasks. | Non-native systems may struggle with handling extensive data, leading to performance limitations in AI-related functions. |
| **Scalability** | AI-native networks are designed with scalability in mind, allowing for the expansion of AI capabilities as needed. | Non-native systems may face scalability challenges when adding AI features, potentially requiring significant modifications. |

[1] Supporting materials for a new FG on AI Native for Future Networks (FG AIFN) SG13-TD279, <https://www.itu.int/md/T22-SG13-240304-TD-GEN-0279/en>

[2] Defining AI native: A key enabler for advanced intelligent telecom networks, <https://www.ericsson.com/en/reports-and-papers/white-papers/ai-native#:~:text=An%20AI%20native%20implementation%20is,lifecycle%20of%20AI%2Dbased%20components>.

## Detailed list of tasks and deliverables to be studied with timeline.

a) Use case analysis: Study and identify use cases for using AI Native approaches in telecommunication networks (focusing on non-radio aspects)

b) Gap Analysis: Study existing initiatives related to AI native networks (focusing on non-radio aspects), identify existing standards in other SDOs, and call out the additional work needed to adopt AI native approaches. It should include standards, industry bodies, and research community.

NOTE- Gap analysis would also include networks feature wise analysis, for enabling use case capabilities, using AI native approaches, including pre-standards framework, extended from 5G.

c) Requirements and architecture framework: Study of requirements derived from the use cases and architecture framework which can satisfy these requirements.

d) Proof of Concepts: design proof of concepts which can be either demonstrators which could be used to demonstrate/study specific technology or implementations of proposed frameworks. These designs would be developed in such a way that they are easily accessible, adoptable and modifiable by the wider community beyond this focus group. Open, collaborative PoCs (similar to ITU FG AN Build-a-thon) may be supported so that external research groups, academia and other interested parties can effectively collaborate with all stakeholders to create practical implementations which can demonstrate specific points in the solutions or even clarify specific parts of the problems which are under study in the FG.

e) Knowledge dissemination activities: Considering the advanced technologies involved in the activities in the group, it is envisaged that collaboration with academia and other research groups currently working the domain of networks and AI would be actively pursued. In order to make this forum more accessible and visible to such groups, the focus group plans to reach out to research groups, SDOs and academia, providing opportunities for exchange of views such as thematic workshops, events on AI Native for telecommunication networks, publication opportunities in collaboration with ITU J-FET and open forums for exchange of data and use cases as in Challenge initiatives such as ITU AI/ML 5G Challenge.

A draft timeline for the deliverables would be as follows, detail timeline is to be decided by FG management:

* July 2024: Approval of FG

NOTE: Meetings and preparation meetings by FG management with any interested parties for background work on technical report on use cases and gap analysis (focusing on non-radio aspects) can be held prior to first meeting of FG

* Post WTSA 2024: First meeting of FG
* September 2025: Technical report on use cases and gap analysis (focusing on non-radio aspects)
* October/November 2025: PoC demos and workshops
* December 2025: Technical Specification on architecture frameworks (focusing on non-radio aspects)
* 1 year after first meeting of FG: End of editing of Final report and publish final report.

NOTE: Interim milestones maybe produced throughout the lifetime of the FG with consultation of members

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