

TERMS OF REFERENCE

Connectivity Credits Backend Software Engineering Consultancy

CONTRACT MODALITY Individual Consultancy

DUTY STATION Home-based/Remote

DURATION OF CONTRACT 6 Months

Purpose of Assignment:

Connectivity Credits is a Giga initiative designed to create stronger incentives for internet service providers to deliver reliable, high-quality connectivity to schools and other underserved locations.

The approach links measurable connectivity performance to digital incentives. Network performance and service delivery are independently measured and verified, and eligible providers can receive Connectivity Credits when agreed service conditions are met. The platform brings together connectivity measurement, verification, rule-based decision-making, workflow orchestration and digital value transfer.

Connectivity Credits is currently moving from MVP and pilot implementations toward a production-grade platform capable of supporting multiple countries, connectivity providers, measurement systems and funding models.

This consultancy will provide dedicated backend software engineering capacity to support this transition. The consultant will work closely with the product and tech team of Connectivity Credits, who will provide the overall technical direction and architecture, and will be responsible for implementing agreed backend services, event-driven workflows, integrations and supporting deployment infrastructure.

Much of the work is greenfield, although existing MVPs and prototypes will be used as starting points where appropriate. The consultant is expected to work independently once the technical direction is clear, make sound implementation decisions, and translate requirements and technical designs into clean, reliable and maintainable software.

Scope of Work:

The consultant will support the design, implementation, testing and deployment of backend components of the Connectivity Credits platform.

Backend Development

- Implement containerized backend services based on the agreed platform architecture.
- Translate product requirements and technical designs into clean, maintainable, and production-ready software.

- Develop stateless services, REST APIs and JSON-based interfaces with appropriate validation, error handling and clearly defined contracts.
- Contribute to the detailed design of components, interfaces and data models, using appropriate abstractions and keeping services modular and loosely coupled.
- Refactor, harden or replace existing prototype components where required as the platform moves toward production.

Event-Driven Systems, Rules and Workflows

- Implement asynchronous and event-driven processing using Apache Kafka or similar technologies.
- Develop producers, consumers and event-processing components, including appropriate handling of retries, idempotency, failures and partial processing.
- Implement business rules and workflows related to connectivity verification, eligibility and value transfer.
- Evaluate and work with rule engines and workflow engines where appropriate.
- Represent business processes using clear rules, states and workflows rather than embedding business logic across unrelated components.

Integrations

- Build API-based and event-based integrations with Connectivity Credits internal and external systems.
- Integrate connectivity measurement systems and data sources using connectors and adapters that keep external system-specific logic separated from core business logic.
- Support integrations with other Giga and Digital Inclusion systems and external technical partners.
- Support blockchain or Web3 integrations where required.

Software Quality

- Write clear, well-structured and maintainable code.
- Implement automated unit and integration tests, with meaningful coverage of important business behaviour and failure scenarios.
- Follow agreed coding conventions and engineering practices.
- Identify technical debt and implementation concerns early and address them pragmatically.

CI/CD, Deployment and Operations

- Create and maintain CI/CD pipelines across development, staging and production environments.
- Automate testing, build and deployment processes where appropriate.
- Maintain containerized deployment of backend services.
- Implement health checks, structured logging, monitoring and operational diagnostics.
- Troubleshoot issues affecting deployed services.

Security

- Treat security as part of design and implementation rather than as an afterthought.
- Apply appropriate authentication, authorization, input validation, secrets management and least-privilege principles.

- Consider security risks across APIs, service-to-service communication, external integrations and event-driven workflows.
- Identify security concerns early and address vulnerabilities as part of normal development.

Documentation and Collaboration

- Maintain documentation for APIs, services, integrations and important technical decisions.
 - Document deployment and operational procedures for the components developed.
 - Work closely with the Product and Tech team of Connectivity Credits on implementation and detailed technical design.
 - Collaborate with product, connectivity, data and engineering colleagues across Giga and Digital Inclusion, as well as external technical partners where required.
- Clearly explain implementation choices and technical trade-offs.

Work Assignment Overview	Deliverables/ Outputs	Delivery deadline		Planned Travel
		Exact date to complete the deliverable	Input days	
Backend platform foundation and core services	Agreed core backend services and APIs implemented or refactored according to the Connectivity Credits architecture; services containerized, documented and covered by automated tests; development/staging CI/CD operational for the components delivered.	31 January 2027	42 days	1 trip to Geneva or Barcelona (3 days)
Event-driven workflows and platform integrations	Agreed Kafka-based event flows, producers/consumers, business-rule/workflow components and priority system integrations implemented, tested and documented, including retries, idempotency and failure-handling mechanisms where applicable.	31 March 2027	42 days	1 trip to Geneva or Barcelona (3 days)
Production readiness, security and operations	Agreed services hardened for production use; production CI/CD established; authentication/authorization and other agreed security controls implemented; logging, health checks, monitoring and operational diagnostics in place.	30 April 2027	21 days	1 trip to Geneva or Barcelona (3 days)
Platform completion and handover	Remaining agreed backend functionality from the technical roadmap implemented and deployed; outstanding priority technical debt and defects addressed; automated tests and technical/operational documentation updated; final technical handover completed.	31 May 2027	21 days	1 trip to Geneva or Barcelona (3 days)

Payment Schedule:

Payment will be made on submission and acceptance of deliverables. UNICEF reserves the right to withhold payment in case the deliverables submitted are not up to the required standard or in case of delays in submitting the deliverables on the part of the consultant.

Important Notes:

- Individuals engaged under a consultancy or individual contract will not be considered “staff members” under the Staff Regulations and Rules of the United Nations and UNICEF’s policies and procedures and will not be entitled to benefits provided therein (such as leave entitlements and medical insurance coverage). Their conditions of service will be governed by their contract and the General Conditions of Contracts for the Services of Consultants and Individual Contractors. Consultants and individual

contractors are responsible for determining their tax liabilities and for the payment of any taxes and/or duties, in accordance with local or other applicable laws.

- The selected candidate is solely responsible for ensuring that the health insurance (and visa if applicable) required to perform the duties of the contract are valid for the entire period of the contract. Selected candidates are subject to confirmation of fully-vaccinated status against SARS-CoV-2 (Covid-19) with a World Health Organization (WHO)-endorsed vaccine, which must be met prior to taking up the assignment. It does not apply to consultants who will work remotely and are not expected to work on or visit UNICEF premises, programme delivery locations or directly interact with communities UNICEF works with, nor to travel to perform functions for UNICEF for the duration of their consultancy contracts.
- UNICEF offers reasonable accommodation for consultants with disabilities. This may include, for example, accessible software, travel assistance for missions or personal attendants. We encourage you to disclose your disability during your application in case you need reasonable accommodation during the selection process and afterwards in your assignment.

QUALIFICATIONS / SPECIALIZED KNOWLEDGE / EXPERIENCE/ COMPETENCIES (CORE/TECHNICAL/FUNCTIONAL) / LANGUAGE SKILLS REQUIRED FOR THE ASSIGNMENT

Minimum requirements:

Education: Bachelors degree in Computer Science, Software Engineering, Information Technology, or another relevant technical field.

Work Experience:

- Minimum three (3) years of professional experience in software development, with substantial hands-on backend development experience.
- Demonstrated experience developing backend services and APIs using Python and/or TypeScript.
- Experience working with distributed or service-oriented applications.
- Experience with CI/CD, automated testing and deployment of backend services.

Language Requirements:

- Fluency in English is required.
- Knowledge of another official UN language is an asset.

Knowledge/Expertise/Skills:

- Strong understanding of software design principles, including modularity, separation of concerns and appropriate use of abstractions.
- Good understanding of REST APIs, JSON-based integrations and relational data modelling.
- Understanding of distributed-system concepts such as stateless services, asynchronous processing, retries, idempotency and failure handling.
- Knowledge of containerized application development and deployment.
- Understanding of secure software development practices, including authentication, authorization, input validation, secrets management and least privilege.

Ability to work independently within an agreed architecture and make sound implementation decisions.

Desirables:

- Experience with Apache Kafka or another event-streaming platform.
- Experience with rule engines, workflow engines or workflow-management platforms.
- Professional experience with Java.
- Experience with blockchain/Web3 systems.