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Nabd: Caller-Perspective Availability Monitoring of Contact-Center Telephony Paths — A Design-Science Study from Saudi Arabia

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Abstract

Contact centers report their own availability from inside the operator's infrastructure: switch uptime, agent login states and queue statistics. None of these measures tells the organisation that owns the service whether a citizen dialling the published number at a given minute actually reaches a human agent. In managed contact-center arrangements this gap matters, because the buyer's service-level agreement is written in terms of the caller's experience while the evidence it receives is written in terms of the operator's systems. This paper reports a design-science study of Nabd, a system developed in-house by AlasilaCX in 2026 that measures telephony-path availability from the caller's perspective. Nabd places scheduled test calls to each monitored center's unified number, traverses the interactive voice response menu with a configured key sequence, at agent depth, counts an attempt as successful only when a live agent confirms presence by keypad acknowledgement, classifies every failure against a fixed code set, escalates through an approved matrix, and computes per-center availability from the resulting record. We derive seven design requirements from the problem space, present the five-module architecture and the nine-document engineering lifecycle through which it was built, and evaluate the artefact against the requirements using documented engineering evidence — 213 automated checks in 14 suites (run of 17 August 2026), 15 numbered database migrations, 10 architecture decision records and operation at reachability depth at four contact centers in the Kingdom. We propose a measurement framework for a subsequent quantitative study of availability outcomes. Contributions include a caller-perspective availability construct, a reference architecture for independent telephony-path probing, and a documentation discipline transferable to other in-house service-assurance tools in regulated markets. Limitations of the single-case design are discussed.

Keywords: contact center; service assurance; synthetic monitoring; telephony availability; IVR; service-level agreement; design-science research; Saudi Arabia

الملخص

نبض: مراقبة توافر المسار الهاتفي لمراكز الاتصال من منظور المتصل — دراسة بمنهجية علوم التصميم من المملكة العربية السعودية

تُبلغ مراكز الاتصال عن توافرها من داخل البنية التحتية للمشغّل: زمن تشغيل المقسم، وحالات دخول الموظفين، وإحصاءات قوائم الانتظار. ولا يُخبر أيٌّ من هذه المقاييس الجهةَ المالكة للخدمة ما إذا كان المواطن الذي يتصل بالرقم المعلن في دقيقة معينة يصل فعلًا إلى موظف بشري. وفي ترتيبات مراكز الاتصال المُدارة تكتسب هذه الفجوة أهميتها، لأن اتفاقية مستوى الخدمة لدى الجهة المستفيدة مكتوبة بلغة تجربة المتصل، بينما الأدلة التي تتلقاها مكتوبة بلغة أنظمة المشغّل. تعرض هذه الورقة دراسة بمنهجية علوم التصميم لنظام نبض، وهو نظام طوّرته شركة الحلول الأصيلة المحدودة داخليًا في عام 2026 لقياس توافر المسار الهاتفي من منظور المتصل. يُجري نبض مكالمات اختبار مجدولة إلى الرقم الموحد لكل مركز مراقَب، ويجتاز قائمة الرد الصوتي التفاعلي بتسلسل مفاتيح مُعدّ مسبقًا، ولا يحتسب المحاولة ناجحةً، على مستوى الوصول إلى الموظف، إلا عندما يؤكد موظف بشري حاضر وجوده بإقرار عبر لوحة المفاتيح، ويصنّف كل إخفاق وفق مجموعة أكواد ثابتة، ويصعّد وفق مصفوفة معتمدة، ويحتسب التوافر لكل مركز من السجل الناتج. نستخلص سبعة متطلبات تصميم من فضاء المشكلة، ونعرض المعمارية المكوّنة من خمس وحدات ودورة الحياة الهندسية ذات الوثائق التسع التي بُني النظام من خلالها، ونقيّم المنتج مقابل المتطلبات باستخدام أدلة هندسية موثقة: 213 عملية تحقق آلية في 14 مجموعة اختبار (تشغيل 17 أغسطس 2026)، و15 ترحيلًا مرقّمًا لقاعدة البيانات، و10 سجلات قرارات معمارية، والتشغيل على مستوى قابلية الاتصال في أربعة مراكز اتصال داخل المملكة. ونقترح إطارًا للقياس لدراسة كمية لاحقة لنتائج التوافر. وتشمل الإسهامات مفهومًا للتوافر من منظور المتصل، ومعمارية مرجعية للفحص المستقل للمسار الهاتفي، ومنهجيةً توثيقيةً قابلًا للنقل إلى أدوات ضمان الخدمة الأخرى المطوّرة داخليًا في الأسواق المنظَّمة. وتُناقش الورقة حدود تصميم الحالة الواحدة.

الكلمات المفتاحية: مركز الاتصال؛ ضمان الخدمة؛ المراقبة الاصطناعية؛ توافر المسار الهاتفي؛ الرد الصوتي التفاعلي؛ اتفاقية مستوى الخدمة؛ بحوث علوم التصميم؛ المملكة العربية السعودية

1. Introduction

Government entities and large enterprises in Saudi Arabia increasingly deliver citizen and customer care through contact centers operated by managed-service providers under service-level agreements (SLAs). The SLA is typically expressed in the caller's terms — the call is answered, within a target time, by a competent agent — yet the evidence a buyer receives is produced by the operator's own systems: private branch exchange uptime, agent login and queue statistics from the automatic call distributor, and periodic reports compiled by the operator. This creates a structural asymmetry. A telephony trunk can be down at the carrier, an IVR menu can loop, a queue can be staffed on paper but not in practice, and the operator's dashboards may still show green.

Synthetic or active monitoring — sending controlled test transactions through a service and measuring the outcome — is a mature practice in web and network operations. Commercial customer-experience (CX) assurance vendors offer scheduled synthetic call testing of contact centers. What is less documented is a locally operated, caller-perspective design with a published method and engineering record.

This paper studies how a Saudi CX services company addressed the gap by designing a purpose-built system. Nabd (Arabic: نبض, ‘pulse’) is an in-house system developed by AlasilaCX's Research and Development Department in 2026. It dials each monitored center's published number on a schedule, classifies any failure, escalates and reports. At agent depth it also navigates the IVR and requires a live agent to acknowledge presence by keypad. Probes at client centers run at reachability depth: the call must connect. Agent depth was tested on the company's internal test lines on 6 August 2026. It has not yet run at a client center. It runs on infrastructure inside the Kingdom, is independent of the contact-center engine under test, and is not tied to a foreign vendor licence. Its platform and four constituent modules are registered as software copyright works with the Saudi Authority for Intellectual Property (SAIP).

We adopt design-science research (Hevner et al., 2004; Peffers et al., 2007) and address three questions:

- RQ1. What does ‘availability’ mean when measured from the caller's perspective, and what requirements does that construct impose on a monitoring system?
- RQ2. How can independent, caller-perspective probing of a contact-center telephony path be realised architecturally?
- RQ3. To what extent does the resulting artefact satisfy the requirements, what engineering evidence supports that judgement, and how should its operational effect be measured?

Section 2 reviews the background. Section 3 sets out the methodology and evidence base. Section 4 derives the requirements. Section 5 describes the artefact and the lifecycle through which it was built. Section 6 evaluates it. Sections 7 and 8 discuss contributions, limitations and future work.

2. Background and Related Work

2.1 Availability in service management

Service-management frameworks define availability as the ability of a service to perform its agreed function when required, and prescribe that it be measured from the perspective of the service consumer (AXELOS, 2019; ISO/IEC 20000-1:2018). In practice, contact-center availability is reported through component metrics — switch uptime, trunk utilisation, agent adherence — which are proxies for, not measurements of, the

consumer's experience. The distinction between component availability and end-to-end service availability is well established in IT service management; what is less common is an instrument that measures the latter for a voice channel.

2.2 Synthetic monitoring and voice quality testing

Synthetic monitoring generates controlled transactions against a live service and records the outcome, complementing passive monitoring of real traffic. In telephony, test-call generators have long been used by carriers to verify routing and voice quality, and IVR testing tools exist to exercise menu logic. Commercial CX-assurance vendors offer scheduled synthetic call testing of contact centers. The literature on customer-experience measurement stresses that experience is formed across the whole journey rather than at component level (Lemon & Verhoef, 2016), which argues for a probe that runs the whole path the caller runs.

2.3 Managed contact-center services in the Saudi context

Under Vision 2030 the Kingdom has expanded digital-government and outsourced citizen-care services, and buyers increasingly write SLAs around reachability and answer performance. Two national instruments shape how such a monitoring system may be built and hosted: the Personal Data Protection Law (which bears on any recording or retention of call data) and the National Cybersecurity Authority's Essential Cybersecurity Controls, ECC-2:2024 (which bear on hosting and access). Nabd was designed with reference to both; no conformance assessment or certification is claimed in this paper.

2.4 Research gap

Scheduled synthetic call testing is offered commercially. What is less documented is a locally operated, caller-perspective design with a published method and engineering record. This study contributes a documented artefact and evaluation for that problem.

3. Research Methodology

We follow the design-science research methodology process of Peffers et al. (2007) — problem identification, objectives, design and development, demonstration, evaluation, communication — framed as a single embedded case (Yin, 2018) in which the company is the case and the four monitored contact centers are the embedded units. The artefact was developed under the company's approved eight-stage development cycle and nine-gate documentation discipline (Section 5.3); this paper reports the design reasoning and evaluation.

3.1 Evidence base

#	Source	Type	Use
S1	Nabd system (current build) and its nine lifecycle documents NBD-CON-001, NBD-SRS-001, NBD-ANA-001, NBD-DAT-001, NBD-UIX-001, NBD-TDD-001, NBD-TST-001, NBD-OPS-001, NBD-PLN-001	Artefact and design documentation	Requirements, architecture, traceability
S2	Architecture decision records NBD-ADR-001 to NBD-ADR-010	Design record	Design principles

#	Source	Type	Use
S3	Automated test record — 14 suites, 213 checks, run 17 August 2026, repeated 18 August 2026 in live migration order; 15 numbered database migrations	Engineering evidence	Evaluation of build quality
S4	Runbook NBD-OPS-001 §1 (state as at 18 August 2026); operator dashboards; attempt log	Operational record	Demonstration
S5	SAIP software copyright registration certificates (five)	Official record	Artefact identity and IP
S6	Company R&D and Innovation File ALSL-RD-CLS-2026-001; R&D Policy & Procedures v1.0; SSDLC procedure	Internal governance documents	Process description
S7	Practitioner observation of operation at four contact centers	Observation	Qualitative evaluation

Table 1. Evidence base.

3.2 Analysis and rigour

Requirements were derived by thematic analysis of the concept note and requirements document (S1) and of the problem framing in S6, cross-checked against the service-management definitions in Section 2. Architecture description follows the technical design document. Evaluation uses requirements traceability supported by the engineering evidence in S3 and S4. The study was conducted by the artefact's owner; to limit bias, evaluation claims are confined to what is documented and reproducible — the test suites and migrations can be re-run from the repository — and no availability statistics for any client are reported. Regulatory references describe design intent only.

4. Problem Analysis and Design Requirements

Analysis surfaced four problems: (a) availability is reported by the operator from component metrics, not measured from the caller's path; (b) a ‘connected’ call is not the same as a ‘served’ call — the path can terminate in an unattended queue; (c) failures are reported late and inconsistently, so root cause is lost; and (d) the buyer has no instrument of its own and depends on the operator's evidence. From these, and from the hosting constraints of Section 2.3, seven design requirements were defined.

ID	Design requirement	Rationale
R1	Measure availability by placing real calls through the public telephone network to the center's published number, on a defined schedule per center	Problem (a); ITIL consumer-perspective availability
R2	Traverse the center's IVR with a configurable key sequence so that the probe reaches the same point a caller reaches	Problem (a), (b)
R3	Count an attempt as successful only on a positive, interactive acknowledgement from a live agent; treat connection without acknowledgement as failure	Problem (b) — served, not merely connected

ID	Design requirement	Rationale
R4	Classify every failure against a fixed, documented code set and record it with timestamp and attempt detail	Problem (c); root-cause analysis
R5	Escalate failures immediately through an approved notification matrix (e-mail and direct contact), with escalation on non-response	Problem (c)
R6	Operate independently of the contact-center engine and of any foreign vendor licence; host and store all data inside the Kingdom, designed with reference to PDPL and NCA ECC-2:2024	Problem (d); Section 2.3
R7	Provide operator screens and per-center availability reports that the buyer can inspect directly, with role-based access	Problem (d); buyer's own instrument

Table 2. Design requirements.

5. The Nabd Artefact

5.1 The probe cycle

Nabd implements availability as the outcome of a repeated probe cycle (Figure 1). Each monitored center has a schedule; at each due time the scheduler dispatches a probe. The probe engine dials the center's unified number through a fourth-generation cellular gateway fitted with a carrier SIM, so that the call travels the same public path a citizen's call travels. On answer, the engine sends the configured DTMF key sequence to traverse the IVR to a live queue. When an agent answers, the engine plays a locally generated Arabic prompt asking the agent to press a key; only that keypress marks the attempt successful. Any other outcome — no answer, busy, IVR loop, queue timeout, connection without acknowledgement — is classified with a fixed failure code, written to the attempt log with its timing, and passed to the alerting module. Availability for a period is the ratio of successful to total scheduled attempts, with documented exclusion rules for attempts outside the center's working hours. Nabd runs probes at two depths, set per center (NBD-SRS-001): reachability, which confirms that the published number answers, and agent depth, which continues through the IVR to a live agent and requires the keypress acknowledgement described above.

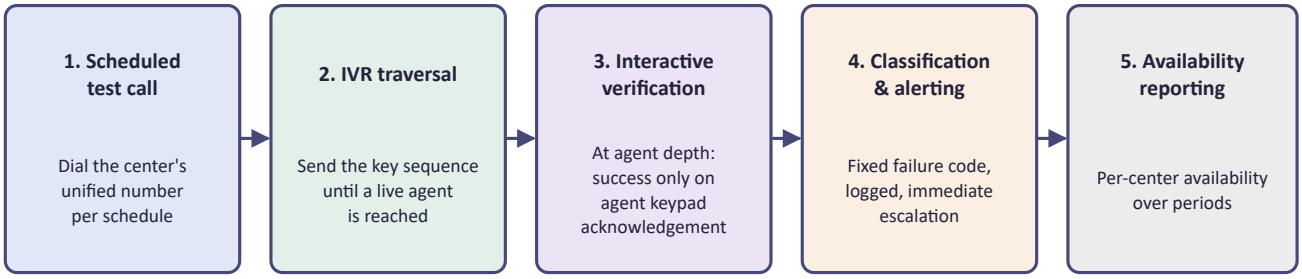

Figure 1. The Nabd probe cycle.

5.2 Architecture

The system is decomposed into five independently scoped software modules, each registered as a separate copyright work (Figure 2, Table 3). The core platform holds the data model, scheduling and dispatch, identity and roles, audit and results store; the probe engine, call-outcome listener and classification/alerting modules form the processing pipeline; the operator interface exposes operations, attempts and availability to

authorised users. The current build monitors four centers on a 15-minute grid at reachability depth, with the operator screens and wall board built and in use.

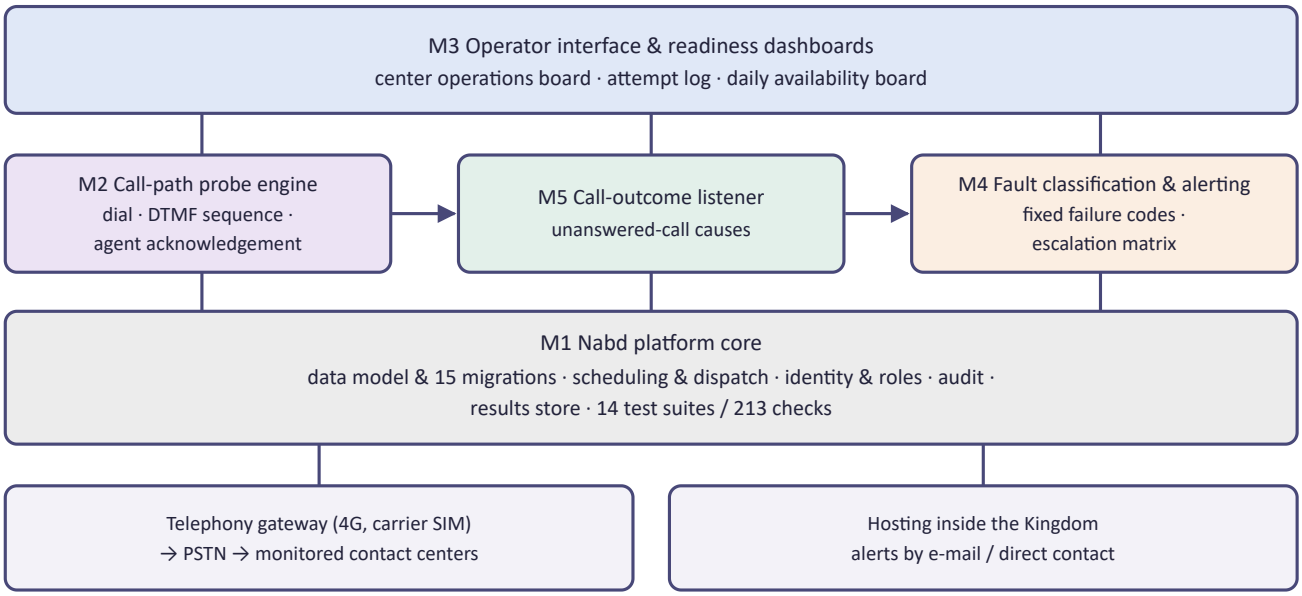

Figure 2. Nabd five-module architecture (checks: test record of 17 August 2026).

Module	Function	SAIP registration	Date
M1 Nabd platform	Core platform: data model and migrations, scheduling and dispatch, identity and roles, audit, results store	26-12-103627363	08/09/2026
M2 Call-path probe engine	Dials, sends key sequence, waits for acknowledgement, classifies result	26-12-103663131	03/09/2026
M3 Operator interface & readiness dashboards	Center operations board, attempt log, daily availability board, permissions and working hours	26-12-103724785	03/09/2026
M4 Fault classification & alerting	Fixed failure codes, alert generation, escalation matrix	26-12-103739818	07/09/2026
M5 Call-outcome listener	Captures the network's cause for every unanswered call and records it against the attempt	26-12-103704260	07/09/2026

Table 3. Modules and copyright registrations (source: SAIP certificates). M1 is listed under the certificate titled "Nabd Platform".

5.3 Engineering lifecycle and documentation discipline

Nabd was built under the company's approved eight-stage development cycle — requirements, design, development, integration, data management, infrastructure, testing and release — with a named role and a recorded output at each stage, and under a nine-gate documentation discipline in which no gate opens before the previous one is closed. Each gate is a document with a fixed identifier, numbered sections and a change log (Table 4). The documents exist as files in the project repository with recorded status and last-updated dates, alongside ten architecture decision records covering, among others, the local asset for the

contact number, the probe type and the scheduling precedence chain, eight diagrams and seven screen wireframes.

Gate	Document	Identifier	Content
00	Concept	NBD-CON-001	Problem, purpose, scope, success and stop criteria (10 sections)
10	Requirements	NBD-SRS-001	Functional and non-functional requirements with traceability table (13 sections)
20	System analysis	NBD-ANA-001	Current and target state, use cases, gaps (6 sections)
30	Data design	NBD-DAT-001	Schema, dictionary, result codes, availability computation (11 sections)
40	Screen specification	NBD-UIX-001	Seven numbered screens SCR-001 … SCR-007, each tied to a requirement (6 sections)
50	Technical design	NBD-TDD-001	Architecture, components, interface contracts, failure handling (13 sections)
60	Test plan	NBD-TST-001	Test environment, risk-based priority, coverage matrix (7 sections)
70	Runbook	NBD-OPS-001	Deployment, verification, operation, incidents, rollback, escalation (10 sections)
80	Development plan	NBD-PLN-001	Work breakdown, sequence, capacity, dates, definition of done (10 sections)

Table 4. The nine documentation gates.

5.4 Design principles

- DP1 – Measure the path, not the component. Availability is what a caller experiences on the public path; internal metrics are inputs to diagnosis, not the measure.
- DP2 – Served means acknowledged. At agent depth, a connection is not a success until a human interactively confirms presence. Client probes currently run at reachability depth.
- DP3 – Every failure has a code. A closed, documented failure taxonomy makes reports comparable across centers and periods.
- DP4 – Independence of the instrument. The probe is separate from the engine under test, owned by the measuring party, and free of foreign licence dependencies.
- DP5 – Sovereignty by default. Numbers, recordings and results stay inside the Kingdom; access is role-based and audited.
- DP6 – Gate-controlled engineering. No stage opens before the previous is closed; every claim about the system points to a numbered document or a reproducible output.

6. Evaluation

6.1 Requirements traceability

Req.	Satisfying design elements	Evidence	Assessment
R1 Real calls on schedule	M1 scheduling; M2 engine; 4G gateway with carrier SIM	NBD-TDD-001; NBD-OPS-001 §2 (gateway received 21 July 2026; carrier voice confirmed 28 July 2026)	Satisfied
R2 IVR traversal	Configurable DTMF sequence per center	NBD-SRS-001; probe engine tests	Satisfied on internal test lines; not yet run at a client center
R3 Acknowledged success	Arabic prompt and keypress acknowledgement	NBD-DAT-001 result codes; suites 0001–0004	Satisfied on internal test lines (6 Aug 2026); client probes run at reachability depth
R4 Coded failures	Fixed failure taxonomy; attempt log	NBD-DAT-001; alerting/escalation suite (17 checks)	Satisfied
R5 Immediate escalation	M4 alerting; approved matrix	Suite ‘alerts & escalation’; NBD-OPS-001 escalation section	Partly satisfied; alerting layer applied to the live system on 18 Aug 2026; end-to-end alert delivery not in operation at that date
R6 Independence & in-Kingdom hosting	Separate infrastructure; in-Kingdom hosting; no vendor licence	NBD-TDD-001; ADR on local asset; access-control tests (13 checks)	Satisfied at design level; no certification claimed
R7 Buyer-visible screens & reports	M3 dashboards; role permissions; working-hours calendar	SCR-001 … SCR-007; suites ‘permissions’, ‘working hours & calendars’ (29 checks)	Satisfied

Table 5. Requirements traceability.

6.2 Engineering evidence

Build quality is evidenced by reproducible outputs rather than assertions. Fourteen automated test suites containing 213 checks run against a throwaway database created for the run and destroyed afterwards, never against the operating environment; the run of 17 August 2026 (08:22 UTC) passed in full. A repeat run on 18 August 2026 (Riyadh time), against a database built in the live migration order, also passed all 213 checks. The system has fifteen numbered database migrations (0001–0015). The suites cover migrations up to 0014; not every migration has its own suite. The live order was not numerical: the alerting migration was applied last. Ten architecture decision records document why the system is built as it is. Table 6 shows the distribution of checks across suites, which reflects where the design carries most risk.

Test suite	Checks	Test suite	Checks
Working hours & calendars	29	Settings change audit	16

Test suite	Checks	Test suite	Checks
Row-level data isolation	23	Re-scheduling on change	16
Closed-case skip on assignment	19	Probe role validity	13
Database schema	19	System test fixes	10
Alerts & escalation	17	Guard uniformity	8
Audio file upload	17	Test-target flag	7
Probe permission restriction	17	Center-open grant	2

Table 6. Automated checks by suite (total 213; source: test record of 17 August 2026).

6.3 Demonstration

As at 18 August 2026 the system was probing four customer contact centers on a 15-minute grid from the company's host inside the Kingdom, with the operator screens and wall board built and served: the centers of a car-rental company, a construction group, a customer-experience center and the company's own contact center, monitored under existing service relationships without a separate revenue line. These probes ran at reachability depth: each call had to connect. Agent depth was tested on the company's internal test lines on 6 August 2026; it had not yet run at a client center. Practitioner observation (S7) indicates one qualitative effect: failures on the telephone path are detected before the client learns of them from citizens. Two further effects are expected but have not yet been measured: that the fixed failure taxonomy moves discussions with operators from dispute to diagnosis, and that the availability figure becomes a shared reference point in service reviews.

6.4 Proposed measurement framework

To enable an independently verifiable quantitative study, we propose the metrics in Table 7, to be computed per center over successive quarters from the Nabd attempt log.

Metric	Definition	Source
Path availability	Successful attempts ÷ scheduled attempts within working hours	Attempt log; calendar
Alert delay	Time from first failed attempt to alert issued	Attempt log; alert log
Time to acknowledgement	Time from alert to operator acknowledgement	Alert log
Failure mix	Distribution of attempts by failure code	Attempt log
Silent-outage rate	Failures detected by Nabd not otherwise reported by the operator in the period	Attempt log; operator reports
IVR traversal time	Time from answer to queue entry	Attempt log

Table 7. Proposed measurement framework.

7. Discussion

7.1 Contributions

The study offers three contributions. Conceptually, it operationalises a caller-perspective availability construct — served, not merely connected — that aligns SLA evidence with SLA intent. Architecturally, it presents a reference design for independent telephony-path probing that a buyer, or a party acting for the buyer, can own and operate inside a data-sovereign jurisdiction. Methodologically, it documents a gate-controlled engineering discipline in which every claim about the artefact is tied to a numbered document or a reproducible output, which we propose as a template for in-house service-assurance tools in regulated markets.

7.2 Implications

For buyers of managed contact-center services, an independent probe converts the SLA from an assertion by the operator into a measurement by the buyer. For operators, the fixed failure taxonomy separates carrier, IVR, staffing and system faults and is expected to shorten root-cause analysis. For policy, the design shows that end-to-end assurance of a citizen-facing voice channel can be achieved with locally owned technology and in-Kingdom hosting.

7.3 Limitations

This is a single case conducted by the artefact's owner. The evaluation is qualitative and evidence-based rather than statistical; the framework in Section 6.4 exists to remedy that in subsequent work. The current deployment covers four centers and a single carrier path; behaviour across carriers, regions and higher probe frequencies is untested. At client centers the system currently verifies reachability only. At agent depth it verifies agent presence, not service quality or resolution.

8. Conclusion and Future Work

Nabd is designed to measure what SLAs promise: that a caller reaches a human agent. It operates at four contact centers in the Kingdom at reachability depth. Agent depth is built and tested on internal test lines, and has not yet run at a client center. Built in-house by AlasilaCX under a documented lifecycle and registered as five copyright works with SAIP, it demonstrates that independent, caller-perspective availability monitoring is achievable with locally owned technology. Future work proceeds on three tracks: empirical application of the measurement framework across centers and quarters; technical extension to multi-carrier probing, speech-based agent verification and integration of availability data into the company's Spinek service-management platform (ALSL-RDI-RP-2026-001); and assurance through independent assessment of the hosted environment against applicable national instruments.

Declarations

Funding. Internal, from Alasila Solutions Limited's research, development and innovation programme.

Competing interests. The authors are employees of the organisation that owns the artefact. No external competing interests are declared.

Data and materials. Lifecycle documents, test records and migrations are proprietary but may be inspected by bona fide reviewers on site. No client availability data is reported.

Conformance statements. References to PDPL, NCA ECC-2:2024, ITIL 4 and ISO/IEC 20000-1 describe design references only; no certification, conformance assessment or legal-compliance claim is made.

Intellectual property. Nabd platform and modules are registered copyright works of Alasila Solutions Limited (SAIP registrations listed in Table 3).

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Appendix A. Research Summary / ملخص البحث

Field	English	العربية
Research topic	Caller-perspective availability monitoring of contact-center telephony paths (Nabd)	مراقبة توافر المسار الهاتفي لمراكز الاتصال من منظور المتصل (نبض)
Research field	Service assurance; synthetic monitoring; contact-center SLA governance; ICT professional services	ضمان الخدمة؛ المراقبة الاصطناعية؛ حوكمة اتفاقيات مستوى خدمة مراكز الاتصال؛ الخدمات المهنية لتقنية المعلومات والاتصالات
Methodology	Design-science research with a single embedded case study	بحوث علوم التصميم مع دراسة حالة واحدة متضمَّنة
Research period	2026 (design and development from Q2; live probing from Q3)	2026 (التصميم والتطوير من الربع الثاني؛ الفحص الفعلي من الربع الثالث)
Completion date	September 2026	سبتمبر 2026
Conducted by	Research and Development Department, Alasila Solutions Limited, Riyadh	قسم البحث والتطوير، شركة الحلول الأصيلة المحدودة، الرياض
Document reference	ALSL-RDI-RP-2026-002, v1.1	ALSL-RDI-RP-2026-002، الإصدار 1.1
Intellectual property	Five SAIP software copyright registrations (Table 3); © 2026 Alasila Solutions Limited.	خمسة مصنفات برمجية مسجلة لدى الهيئة السعودية للملكية الفكرية (الجدول 3)؛ حقوق النشر 2026 محفوظة لشركة الحلول الأصيلة المحدودة
Key outputs	7 design requirements; 5-module reference architecture; 6 design principles; traceability to 213 automated checks (17 August 2026) and 9 lifecycle documents; measurement framework (6 metrics)	سبعة متطلبات تصميم؛ معمارية مرجعية من خمس وحدات؛ ستة مبادئ تصميم؛ تتبع إلى 213 تحققًا آليًا (17 أغسطس 2026) و9 وثائق دورة حياة؛ إطار قياس (6 مؤشرات)

Table A1. Research summary.