COMMUNICATIONS

ALLIANCE LTD

INDUSTRY GUIDANCE NOTE IGN 022

NUMBER PORTABILITY FEASIBILITY STUDY

Number Portability Feasibility Study

Industry Guidance Note IGN 022

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VERSION HISTORY

This document constitutes: Version 1 of Industry Guidance Note IGN 022

Date	Version	Comments/Changes
17/11/2021	1	First release
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1 BACKGROUND

A Number Portability Feasibility Study (Study) was initiated by the Communications Alliance Numbering Steering Group (NSG) to examine the feasibility of consolidating the number portability systems, increasing automation, improving business efficiency and customer experience, and improving system availability and resilience.

The study identified that implementing a **Co**nverged **N**umber **Port**ability **S**ervice, called **CoNPortS**, and capable of supporting Mobile, Local and Inbound numbers would be a suitable long-term goal for improving number portability. CoNPortS utilises a modern, standard, and streamlined method for the communication of data between IT systems in a manner that can achieve service simplification, scalability, high performance and high security for all Carriage Service Providers (CSPs) large and small. It is expected that the modern IT Systems of Carriers and CSPs will have the capability to integrate with CoNPortS over time. However, many existing legacy IT systems would likely require considerable work and a compelling case could not be made for the immediate implementation of CoNPortS at the time of undertaking the Study in 2021. This situation is expected to change as legacy IT systems are retired and replaced by modern systems and the CoNPortS design can be used to guide the development of porting arrangements for these new systems. The cost benefit analysis will be reconsidered in 2024.

The study proposes a phased introduction of CoNPortS, as a means of spreading costs and development effort, as well as suggesting some short-term improvements that could be considered to enhance the performance of existing LNP processes and systems.

2 OBJECTIVE OF THIS GUIDANCE NOTE

This Guidance Note is intended for Carriers and CSPs to assist them as they plan their future technology and business process roadmaps for services that involve number portability.

It summarises the findings in the report on the Number Portability Feasibility Study (the report), including the report recommendations, an overview of the CoNPortS model, suggested implementation phases, and potential risks.

3 STUDY FINDINGS

The Study produced a design for a single system capable of supporting all portable number types, called CoNPortS. It is based on the use of API technology, a technology expected to be a key feature of support systems deployed in carriers and CSPs for the foreseeable future.

The Study identified technical advantages in adopting a new centralised solution to implement CoNPortS.

In weighing up the costs and benefits of the CoNPortS model, the nett benefit was found to be marginal if implemented at the time of conducting the Study in 2021. The report recommended revisiting the cost benefit analysis in three years' time, i.e. in 2024. The passage of time will allow an informed industry decision following work planned or already underway by many Carriers and CSPs to address the consolidation of internal IT systems and the replacement of outdated or legacy systems.

The Study found that MNP and INP were largely meeting service provider and customer requirements, with some potential for improvement in MNP regarding the hours of operation.

The area where maximum benefit can be achieved is Local Number Portability. This Study identified Customer and Carrier/CSP benefits that could arise from upgrading number portability systems and associated automation of porting functions. Changes in technologies across core networks, access networks and associated IT support systems are expected to enable more rapid service activation and the associated number porting.

Local number portability is expected to be increasingly less likely to meet service provider and customer expectations in the future, due to factors such as:

- Shorter service activation timeframes in an NBN environment will be difficult for LNP to match.
- The current LNP file transfer approach to information sharing is out of date.
- Third party port processes add complexity that can potentially be removed.
- LNP processes do not readily support end to end automation of porting functions.
- Complex porting requires restructuring with a view to streamlining activities and reducing uncertainty around porting timeframes.

The report made eight recommendations (listed in Appendix A). As well as recommending industry adopt the CoNPortS model as the long-term goal, the report recommended consolidating the three number portability industry codes into one document, to complement the adoption of CoNPortS as the long-term goal for number portability.

Other recommended areas for industry to consider include:

- assessing a 'build vs buy' decision (i.e. a custom build vs tailoring an 'off the shelf' solution),
- a proposed study in three years' time to assess if there have been changes in the costs and benefits of the options to implement CoNPortS.

4 NUMBERS AND NUMBER PORTABILITY

4.1 Numbers and Number Portability

Number portability obligations in Australia are contained within the *Telecommunications Numbering Plan 2015* (Numbering Plan) determined by the Australian Communications and Media Authority, under direction from the Australian Consumer and Competition Commission.

Detailed arrangements for the porting of numbers are contained within Communications Alliance Codes and Guidelines, with separate arrangements for local, mobile, and inbound numbers. Refer to the References section (section 9) for more information.

There are three portable number types that are considered in the Study:

- Local, or Geographic Numbers.
- Mobile Numbers.
- Freephone and Local Rate Numbers (FLRN), also known as Inbound Numbers.

4.2 Local Number Portability (LNP)

LNP is implemented as a decentralised system, with each participant in LNP needing to establish a dedicated link from their LNP system to the LNP system of each Carrier or CSP that they wish to port numbers with. Some CSPs have not established links with every other CSP involved with LNP, and as a result, there are some porting cases between CSPs that are not directly supported.

Each time a new CSP wishes to enter the LNP environment, links must be established and tested with each of the existing LNP participants. This testing is costly, and the cost rises linearly as the quantity of LNP participants increases.

LNP is divided into two categories Simple and Complex. A Simple LNP port involves just one local number. A Complex port is defined as any port that is not a Simple port, that is, any port where there is more than one number associated with the service.

Simple Ports

The existing LNP process for simple ports is largely meeting industry requirements, but the Study identified a perception by some CSPs that the port validation process takes too long. The existing Code process requires submission of a simple port notification by the gaining CSP on the first day and a full working day for the losing CSP to assess and respond to the port notification. Hence, the earliest that the port can occur is on the third day after the port notification. The Electronic Cutover process is considered to be timely even if other processes such as port validation are not.

The volume of LNP Simple ports is estimated to be 61,000 ports per year, less than 2% of the volume of mobile number ports.

Complex Ports

The definition of Complex porting encompasses a wide range of services and complexity and a wide range in the quantity of numbers, from very small (one or two numbers) to

very large (thousands of numbers). Validation of a port request is also more complicated where more than one service is involved.

Pre-port number validation is undertaken to reduce the quantity of rejected complex port notification advices.

The use of Complex porting as a catch all category masks the underlying tasks required and impacts on the resources and capabilities of the Donor Carrier or CSP (i.e. the Carrier or CSP to whom the number was originally allocated in the Numbering Plan). The time frames permitted for complex number porting may not be required for each type of service encompassed by the category. This applies across pre-port number validation, complex port notification and port cutover. Similarly, the overall effect of a broad category is a process that may be overly resource intensive. The current LNP processes are not conducive to end-to-end automation of any of the "less complex" services within the category.

It is estimated that around 1.25 million local numbers are ported in a year via the Complex LNP process, via an estimated 21,000 porting transactions. When compared to mobile number porting, the volume of numbers ported is about one third, but the quantity of port transactions is less than 1% of the MNP transactions.

Third Party Ports

Third Party Porting refers to the situation where the Gaining Carrier and the Losing Carrier are not the Donor Carrier/CSP. The Donor Carrier/CSP must be involved in the porting process as it provides a transit routing solution while the Port is in progress. This process was developed to suit the network technology of the 1990s and the speed of the porting process at the time. One significant impact of the process is that if the Donor Carrier/CSP porting system is not available, porting between other Carriers may be delayed until the Donor porting system is available again. In some cases the Donor Carrier/CSP may not have direct connection to other parties engaged in the Port, which may require a series of hops to move a number between CSP's.

4.3 Mobile Number Portability (MNP)

MNP is a distributed system and requires numerous interactions between participants to achieve a single port.

MNP is a two-tiered system that overall, enables a customer to move from any service provider to any other service provider. The first tier enables porting of numbers from one mobile network to another network. This first tier is defined via the MNP Code and associated guideline documents issued by Communications Alliance. The second tier enables porting between CSPs where the CSPs are using the same underlying network, for example, between resale CSPs. The second tier is defined between each of the mobile network operators and their associated CSPs.

MNP has by far the largest volume of port transactions when compared to INP and LNP port transactions, at 1.8 million ports in twelve months to September 2021. The volume of actual numbers ported is comparable between MNP and LNP, as a single complex local number port can involve hundreds or thousands of numbers.

4.4 Inbound Number Portability (INP)

The INP solution is a centralised system operated by an industry owned company, INMS. The INP solution is based on industry specifications. The Study notes that the current INP system incorporates number management functions that have ongoing requirements.

This includes a link between the INMS system and the ACMA number management system (operated by ZOAK under contract) for functions such as number allocations.

The volume of ports processed by the INP system annually is estimated to be 16,000, a small volume when compared to MNP and LNP.

5 CONVERGED NUMBER PORTABILITY - CONPORTS

5.1 The Converged Number Portability Solution Concept

Porting a number(s) is a coordinated sequence of steps initiated by the gaining CSP and responded to by the gaining carrier, losing carrier, losing CSP and other network providers. The current approaches for MNP and LNP are characterised by the associated point to point interfaces between the gaining CSP and all other participants in the process of porting. This approach requires bilateral agreements to be made between each CSP, systems integration and coordination of steps, testing between each participant, porting specific functionality (common rules/validations) being implemented in all CSPs and Carriers, in-progress port data to be managed by all participants. These steps are implemented separately for each of MNP and LNP – a situation that lends itself to differences in all aspects for all porting participants (i.e. CSPs, Carriers, Customers, Network Providers, Portability Service Suppliers).

With this in mind, the proposed approach to rationalise and modernise number portability is to clearly define a converged (i.e. **common** and **consolidated**) number portability service. Combining the concepts of a common and consolidated service, we arrive at the concept of the Converged Number Portability Service - CoNPortS.

It is a **common** service as it is intended to be used by any and all CSPs involved in number portability – define/build/implement once and use it by all number portability participants – CSPs, Resellers, Carriers, Network Providers, Portability Service Providers, 3rd Party Users of Portability Information and in support of Legal, Fraud, Emergency processes – (refer to section 6.5, CoNPortS Design - Functional Model).

It is a **consolidated** service as it is intended to be capable of supporting any type of number (Mobile, Local, Freephone, Local Rate) being ported, thus enabling the replacement of the existing porting arrangements with a new arrangement based on the consolidated service – define/build/implement once and use for all number types able to be ported.

The target objectives of the CoNPortS:

- Define an approach that realises a common customer experience – vision is to improve the customer experience. [Refer to section 5.2, Customer Benefits of CoNPortS].
- Define an approach that reduces cost and complexity by removing the need for each CSP/Carrier to implement Porting Specific functionality by centralising this capability – Validations/rules, Ported Number Registers, Reporting in support of compliance/regulations.
- Reduce industry wide costs to participate in number portability for new entrants, and existing participants.
- Define an approach that facilitates the rationalisation of the existing porting arrangements. Transition from existing porting arrangements to CoNPortS based porting arrangements.
- Define an approach that facilitates the modernisation of the existing porting arrangement implementations. Transition from existing techniques (distributed model for MNP/LNP) and technologies (point to point Message/File passing) to a ReSTful API based approach.
- Define an approach that realises a common CSP/Carrier integration experience.

All CSPs need to maintain other existing business objects i.e. data or records, such as Customers, Accounts, Products, Services, Allocated Numbers. These business objects are required to be managed regardless of number portability.

As number portability depends on the objects noted above for customer authentication, service activation, network routing, etc. the proposed approach (refer to the separate CoNPortS Solution Design document, sequence diagrams) assumes the reuse of these existing business object management capabilities in support of number portability.

For example, a Customer (legal identity) has an Account (billable identity) that is for a Product (commercial offering) that delivers a Service (user experience) that uses a Number (public identifier of the Customer's Product/Service).

The key point is Number Portability is a capability that is effectively the same across CSP's/Carriers, even though the implementation (systems, technologies, processes) of the business objects internally to each CSP/Carrier are typically quite different. Defining a shared number portability capability should therefore be considered with the method for integrating these shared services between CSPs/Carriers.

To modernise system to system integrations, the report proposes using APIs (Application Programming Interfaces) in particular, a Representational State Transfer (ReST) API software style.

API's facilitate a standard and streamlined method for the communication of data between systems in a manner that, at an industry and standards based level, achieves:

- Service Simplification – lends itself to well defined business services, such as CoNPortS. [Refer to section 6 Overview of CoNPortS Design and Solution]. Typical business operations of Create, Read, Update, Delete are implemented using the well-known HTTP/Web based methods of POST, GET, PUT and DELETE.
- Service Scalability – each request is independent of any other application request (stateless between interface calls).
- Service High Performance – ReSTful API's can be cached.
- Service Security – API calling and thus data access authorisation management through API keys and OAuth2.

These are all critical elements in the case of CoNPortS where a centralised CoNPortS is proposed for the Solution Design. [Refer to section 6.1, CoNPortS – Solution Design.]

For example, this is how Twitter, Facebook, Google, Amazon, etc interface their business services to the world (all via APIs).

5.2 Customer Benefits of CoNPortS

The customer benefits of CoNPortS, identified by the study, include:

- Timeliness – less time to complete local number ports for residential, business and enterprise customers.
- Availability at any time and any day.
- Self Service – porting will not be delayed if the customers uses a self service sales channel.
- Consistency – for all ports i.e. for local/geographic, mobile and inbound numbers.
- Reversals – rapid reversals where the port was either unauthorised or unsuccessful.
- Lower Port Out Costs.
- Security – improved as CoNPortS allows additional customer ID methods.

5.3 Service Provider Benefits of CoNPortS

The study identified benefits of CoNPortS for Service Providers include:

- More control over future improvements.
- Consistency – same porting approach for all types of portable numbers,
- Automation of some or all porting functions on an end-to-end basis.
- Alignment with business operations including retail store opening hours.
- Strengthened compliance with the portability codes.
- Improved reversals process.
- Longer term – reduction in third party ports and development of a single number portability code.
- Improved security and resilience using industry standard security protocols (see section 2.3) for API interactions.
- A model suited to any scale of operations – it could work for all CSPs.

The study weighed up these benefits against the estimated costs of implementing CoNPortS, which resulted in a finding that it was of marginal overall benefit to implement CoNPortS at the time of conducting the study in 2021, and the outcome for each CSP would depend on the assumptions each made.

The costs of number portability systems are difficult to isolate from other functions within a CSP business. These will vary between different CSPs depending on the relative life stage of the IT systems in use.

Relevant costs for implementing CoNPortS would include:

- Consolidation of overlapping systems
- Retirement of legacy systems.
- Choosing to build, maintain and operate systems internally vs engaging an external portability service provider.

6 OVERVIEW OF CONPORTS DESIGN AND SOLUTION

6.1 CoNPortS - Solution Design

The Study considered four options:

1. Option 1 Distributed model based on evolution of existing MNP
2. Option 2 Distributed model based on evolution of existing LNP
3. Option 3 Centralised model based on evolution of existing INP
4. Option 4 Centralised model, new development (or purchase)

The Study recommended CoNPortS be implemented as a Centralised model, i.e. option 4.

This model is characterised by each of the participants relying on a centrally published service (CoNPortS) that provides all the functions and management of Number Portability data required to achieve the porting of a number. The current INMS (FLRNP – Freephone and Local Rate Number Portability, implemented in the INMS platform) is an example of this model. This model is an alternate to the Distributed Model.

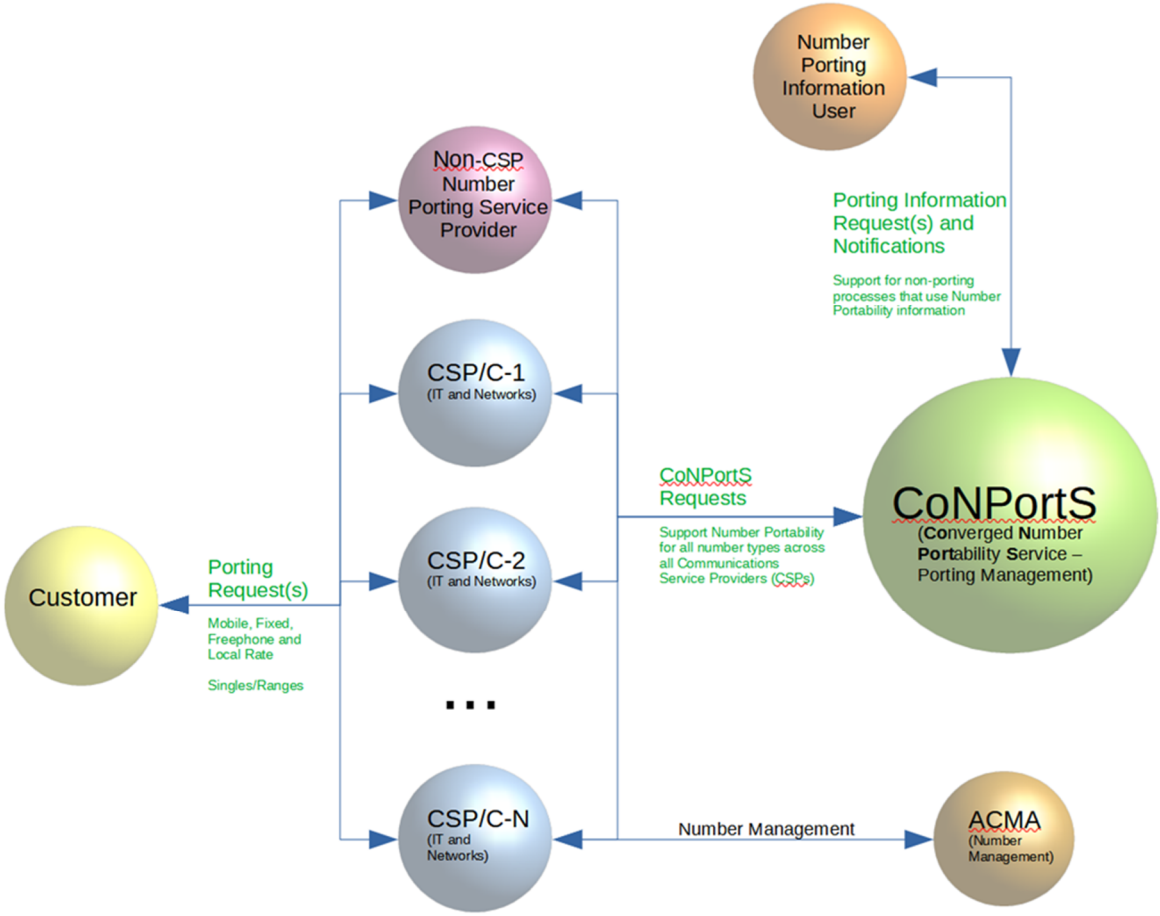

FIGURE 1
CoNPortS Context

6.2 CoNPortS component models

The CoNPortS Design is made up of a:

- Data Model – The data that relates to the Number Portability Service i.e. data associated with a Number being ported.
- State Model – The states the Number(s) being ported (CoNPortS instance) moves through from commencement to its final state.
- Functional Model – The functions (operations) that apply to a CoNPortS instance (i.e. Number(s) being ported). This is subject to its current state and data that defines the number(s) being ported.

6.3 CoNPortS Design – Data Model

The CoNPortS Data Model facilitates a single Number Portability service/capability that is consistent and defined by its data,

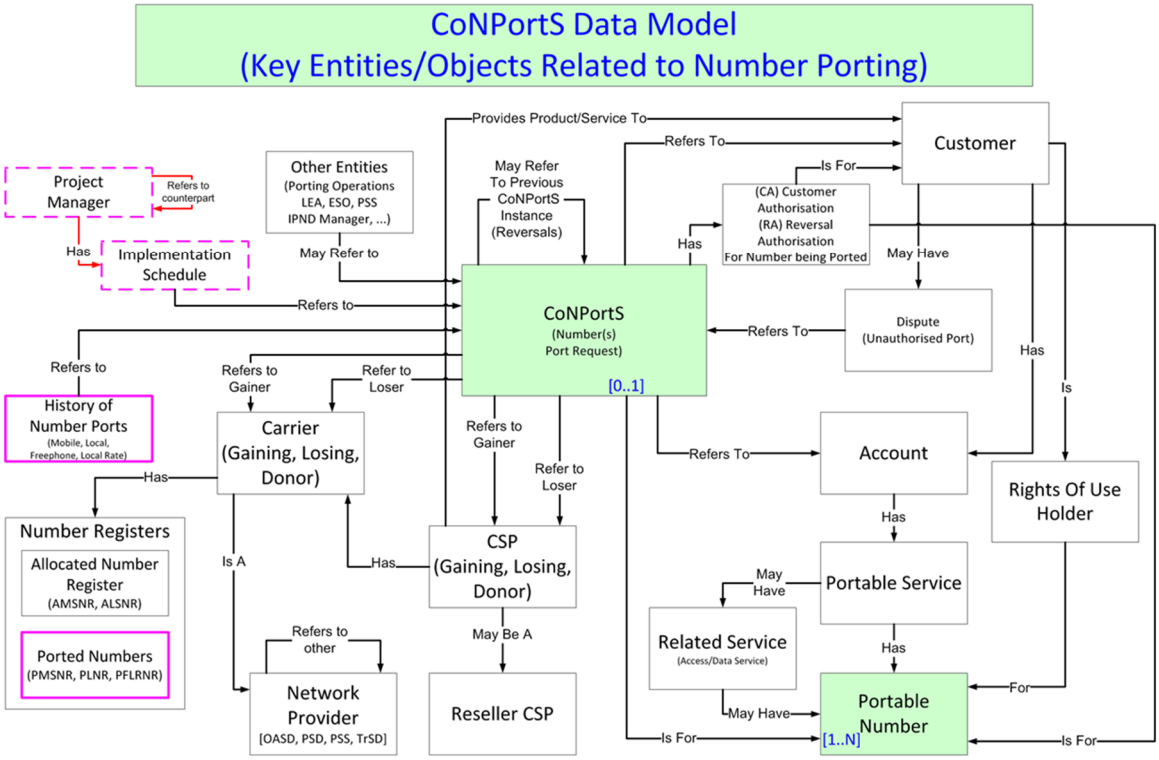

FIGURE 2
CoNPortS Data Model

6.4 CoNPortS Design – State Model

CoNPortS supports four processes for porting at the discretion of the gaining CSP/carrier, namely:

- Four step – Number Discovery, Port Notification, Port Disconnection, Port Connection,
- Three step – Port Notification, Port Disconnection, Port Connection,
- Two step - Port Disconnection, Port Connection, or
- One step - Port Disconnection.

The report has more information on these four processes. Refer to Figure 3 below for an example of the one step process for the CoNPortS state model.

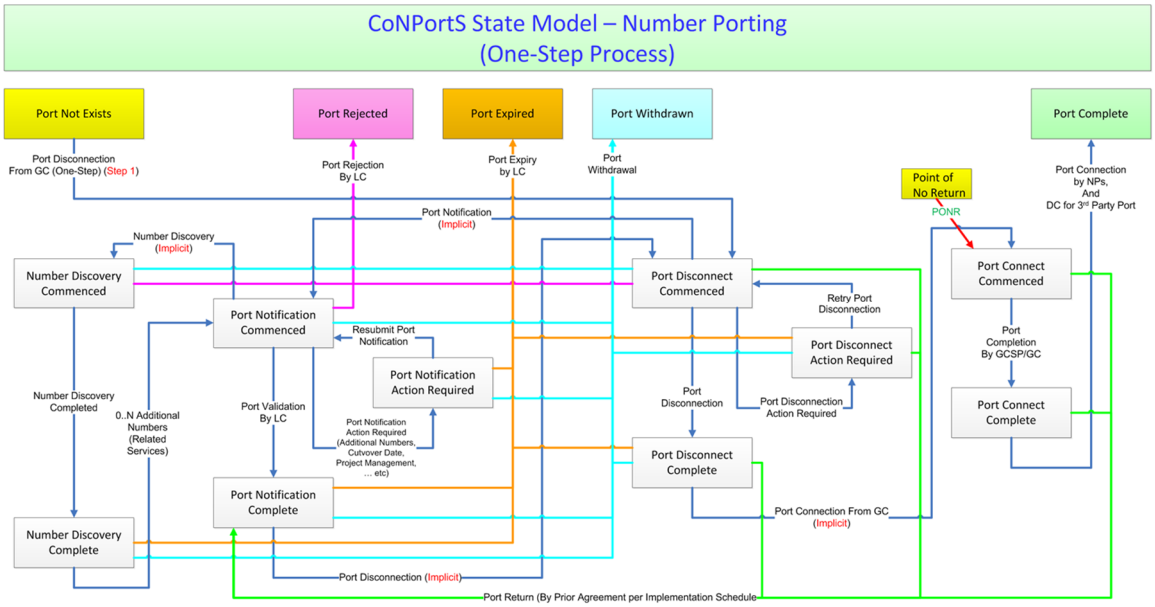

FIGURE 3
CoNPortS State Model

6.5 CoNPortS Design – Functional Model

The Functional Model has a set of a generalised number porting capabilities for operations/functions that can apply to the CoNPortS.

In simple terms the Functional Model describes WHAT key functionality is exhibited by CoNPortS.

The Functional Model should be considered in conjunction with the CoNPortS Data Model and CoNPortS State Model.

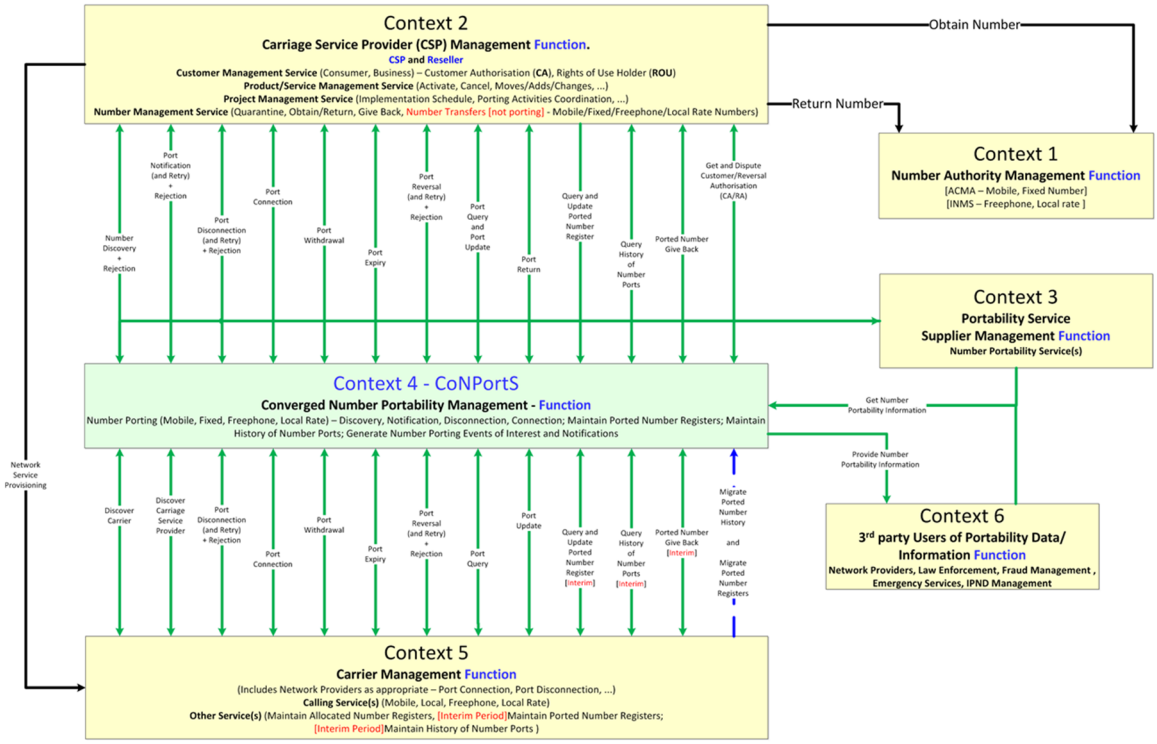

FIGURE 4

CoNPortS Functional Model

7 IMPLEMENTATION

7.1 CoNPortS Phased Implementation

A suggested phased approach could deliver improvements in an iterative fashion where each iteration sees an accumulation of benefits.

A proposed timeline is in Figure 5.

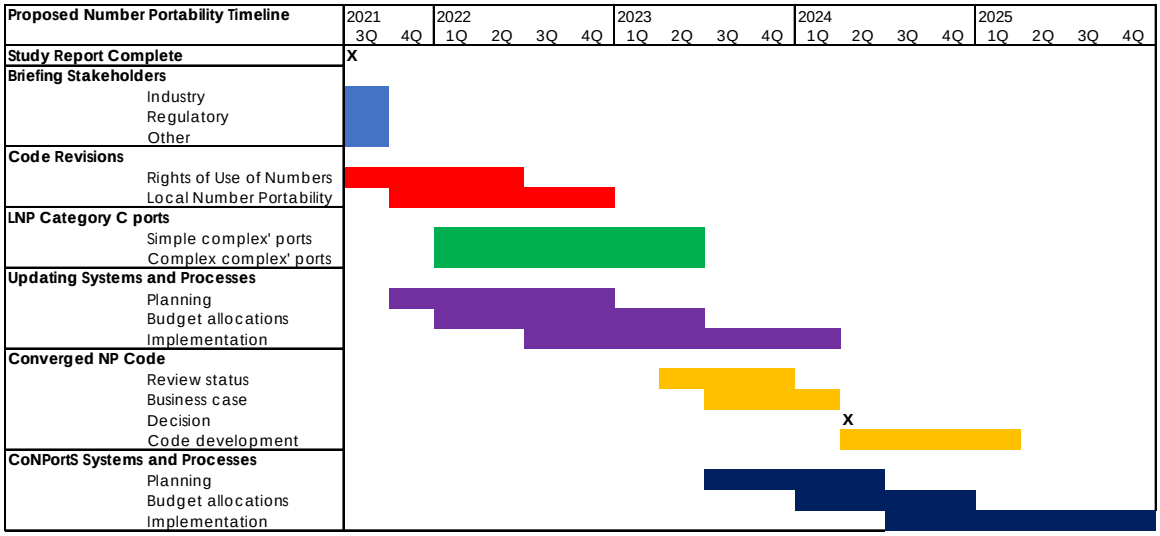

FIGURE 5
Proposed Timeline

7.2 Short Term Improvements to LNP

The report suggested short-term improvements could be made to existing LNP processes by:

- Increasing the frequency of Porting Notification Order (PNO) files.
- Updating the LNP Code to reduce the times allowed for interaction responses (e.g. for acknowledgement, for acceptance of a port request).
- For complex ports, enhancing the interface to distinguish between numbers to be ported, and those that should be removed (to reduce rejections of porting requests when the request involves a subset of all numbers comprising a Product or Number Management Group at the LCSP).
    - o Establish a process equivalent to ECA used for Simple LNP to enable porting of the less complex of the complex services.
    - o Establish a process to use the call diversion/call forwarding function in defined use cases as the initial rapid response to a local number porting request, with follow up of porting using existing LNP processes.
    - o Treating some CAT C requests as one or more CAT A request(s).

8 RISKS

8.1 'No change' Risk

The risk for industry continuing unchanged with the existing number portability Codes and associated processes is the likelihood of increasing customer dissatisfaction due to outages and delays in porting due to the legacy systems and processes no longer being sustainable or fit for purpose. Industry will also face higher costs due to the need to support interfaces with the legacy processes.

8.2 CoNPortS Risks

Moving to a new number portability system carries risks associated with its design and implementation, including:

- Inadequate design or development,
- Timing delays,
- Disruption during migration,
- Cost over-runs impacting some or all Carriers and CSPs,
- Reliability and survivability of the CoNPortS System.

Like planning for any update or change to existing systems and processes, the industry would develop strategies to manage or mitigate the identified risks that are associated with CoNPorts.

9 REFERENCES

Publication	Title
Industry Codes	
C540:2013 incorporating variation No.1/2018	Local Number Portability http://commsalliance.com.au/Documents/all/codes/c540
C570:2009 incorporating Amendment No.1/2015	Mobile Number Portability http://commsalliance.com.au/Documents/all/codes/c570
C657:2015	Inbound Number Portability http://commsalliance.com.au/Documents/all/codes/c657
Industry Guidelines	
G538:1999	Interconnect Model https://www.commsalliance.com.au/Documents/all/guidelines/g538
Legislation	
Telecommunications Act 1997 *http://www.comlaw.gov.au/Series/C2004A05145*	

APPENDIX

A REPORT RECOMMENDATIONS

A1 Recommendations

The eight recommendations from the study report are in Table 1.

TABLE 1

Feasibility Study Recommendations

Recommendation	Initial Communications Alliance view and comments
Adopt CoNPortS as the long term goal **1:** The CoNPortS Design and Solution Design be adopted by Communications Alliance as the long-term goal for number portability.	Supported.
Implement a centralised model **2:** The CoNPortS (general number portability service) be implemented following a Centralised model.	Noted
A 'Build vs Buy' decision. **3:** Communications Alliance obtain Buy Option Costs, along with a detailed review of the CoNPortS Build Option, with this information perform a comparison between the two options and then decide which approach to adopt.	Noted. This is to consider getting a quote for an 'off the shelf' solution; as an alternative to custom IT development.

Recommendation	Initial Communications Alliance view and comments
Detailed Design (4A) or Specification (4B) **4A:** Assuming the recommendations to adopt CoNPortS as the long-term portability solution and a Centralised Design approach, and subsequent to any decision to Build the CoNPortS component, Communications Alliance establish a working group to produce a detailed **design** of CoNPortS sufficient to support development of a CoNPortS system and for Carriers and CSPs to develop corresponding interfaces and capabilities.	Noted.
Detailed Design (4A) or Specification (4B) **4B:** Assuming the recommendations to adopt CoNPortS as the long-term portability solution and a Centralised Design approach, and subsequent to any decision to Buy the CoNPortS component, Communications Alliance establish a working group to produce a detailed **specification** of CoNPortS sufficient to support purchase of a CoNPortS system, or subscription to a CoNPortS service, and for Carriers and CSPs to develop corresponding interfaces and capabilities.	Noted.
Costs of full CoNPortS implementation **5:** If a waterfall approach is preferred for CoNPortS implementation, it is recommended that Communications Alliance undertake a further study of CoNPortS costs in 2024 (or earlier*) for the purpose of confirming that benefits will outweigh costs and to determine which of Option 4 or Option 1 delivers the greater overall benefit to industry. The section on "CoNPortS Migration Options" has details of the options for moving from current arrangements to a consolidated porting arrangement. * If all providers that have identified an era of upgrade/consolidation of their IT systems that relate to porting arrangements, sufficient for a lesser impact/cost profile of changing porting arrangements prior to 2024, then it is further recommended that this timeframe be the driver for a review of costs.	Noted. The proposed study in three years' time would be to assess if there have been changes in the costs and benefits of the options to implement CoNPortS.

Recommendation	Initial Communications Alliance view and comments
Consolidate number portability requirements into a single Code **6:** To complement the adoption of CoNPortS as the long-term goal for number portability, it is recommended that Communications Alliance produce a single number portability Code.	Supported.
Complex Services **7:** Communications Alliance and the Numbering Steering Group commence work to revise the porting arrangements for Complex services in the context of a CoNPortS environment.	Noted. The report identifies two groups of complex services i.e. simpler cases that could be treated as multiple simple ports, and cases that require project management.
Terminology **8:** Communications Alliance should avoid using the term "Carrier" in any combined number portability Code when referring to the operators of telephone switching equipment. For example, the Service Deliverer terminology, from the Communications Alliance Interconnect Model G538, could be used.	Noted.

APPENDIX

B SOLUTION SCOPE

B1 In Scope

The solution scope includes:

(i) All Carriage Service Providers (CSPs) subject to number portability obligations.

(ii) All Numbers that may be assigned to a portable service.

(iii) Consideration of non-functional and performance criteria.

(iv) Identification of third-party systems and processes that have a dependency relationship with number portability.

(v) Assessment of how the solution design can support a resale CSP to moving its customer base from one network to another.

(vi) Identification of impacts arising from the Annual Number Tax number audit.

(vii) Identification of drivers and roadblocks for regulatory requirements and interconnect commercial agreements.

(viii) Estimation of the required effort to revise related Industry Codes, Standards and Guidelines.

(ix) Estimation of the required training of staff in new procedures.

(x) Recommend potential simplification of porting processes, for example, whether there is a simpler process for dealing with port reversals.

(xi) Number Portability Use cases for all number types referenced in the MNP, LNP and FLRNP codes. Including but not limited to:

a. Unauthorised ports and dispute resolution; and

b. Number Quarantine and Give Back.

(xii) Definition of the role of number portability solution providers.

(xiii) Transition from existing NP systems to new NP system.

(xiv) Conduct a risk analysis e.g. overall project risk, transition risks. In particular, system reliability and availability.

(xv) Decommissioning of existing number portability arrangements (where the effect of such decommissioning is potentially material).

B2 Out of Scope

The solution scope excludes addressing details of:

(i) Number management

(ii) Service supply, including activation and issuing of numbers

(iii) Network Conditioning for new number ranges

(iv) Processes to address bank fraud

(v) Authorisation for LEA or ESO access to ported number information.

(vi) Any coordination aspects required for the cutover of corporate networks from one CSP to another.

(vii) Underlying IP addressing in Voice over IP networks.

Communications Alliance was formed in 1997 to provide a unified voice for the Australian communications industry and to lead it into the next generation of converging networks, technologies and services.

In pursuing its goals, Communications Alliance offers a forum for the industry to make coherent and constructive contributions to policy development and debate.

Communications Alliance seeks to facilitate open, effective and ethical competition between service providers while ensuring efficient, safe operation of networks, the provision of innovative services and the enhancement of consumer outcomes.

It is committed to the achievement of the policy objective of the *Telecommunications Act 1997* - the greatest practicable use of industry self-regulation without imposing undue financial and administrative burdens on industry.

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