



## Ensuring DDI resilience

Protecting against incoming call failure within the PSTN

Version 1.0



## 1 Executive Summary

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Organisations are looking to enhance their preparedness against disruptive events by eliminating single points of failure within their voice and data networks. While they can control the resilience within their own networks, organisations are still dependent upon external networks, such as the PSTN, for the delivery of incoming calls. A failure to deliver incoming calls can impact the revenue and reputation of the business, and organisations are therefore keen to protect themselves against this.

While a number of network operators, including smartnumbers, provide new services for increasing the resilience of incoming calls, the very migration to these services can itself introduce a Single Point of Failure. This is due to the fact that in order to use these new services, such as smartnumbers, organisations must first move their telephone numbers from the original network provider to these services. The process of moving telephone numbers (DDI's) between networks is known as 'porting' and the 'porting' process leads to an unavoidable single point of failure. This limitation of 'porting' DDI's is well known, is unavoidable, and will likely be the case for at least the next 8 - 10 years.

In order to avoid this Single Point of Failure which is introduced whenever DDI's are moved between networks, it is therefore necessary to adopt new DDI's that were originated on these new, resilient networks or services. smartnumbers recognise that few organisations like to use new DDI's, especially when their existing DDI's are vital, well known, and have been in the public domain for some time. However, there are a number of tried and tested processes and methods that can be adopted to migrate customers smoothly and easily over to using new numbers.

This white-paper outlines the background as to;

- Why the migration to DDI's across networks will always introduce an unavoidable single point of failure
- How organisations can remove the single point of failure by migrating to new DDI's with the minimum of disruption and inconvenience to callers.

The result of this is that if the guidelines in this documents are followed, it is possible for organisations to adopt new resilient networks and services, removing any Single Points of Failure, and to do so in a way which is easy to manage, transparent and with minimum impact and inconvenience to callers.



## 2 The Single Point of Failure

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It is an unavoidable fact that moving an organisations' DDI's between carriers, and sometimes between networks operated by the same carrier, will always introduce a Single Point of Failure in call delivery.

This is because the process of moving telephone numbers between networks relies on a process known as 'porting'. With DDI's that have been 'ported', the core switches in the PSTN are not able to be made aware of the fact that a DDI has been moved to a new network, and will continue to route calls to the original telephone exchange that used to house the DDI.

Once the call routes to this 'originating exchange', it is this exchange that recognises that the DDI has been moved to a new network. The originating exchange then applies a 'porting prefix' to this call, and re-routes it back over the PSTN to the new network.

The process is tried and tested, works well and thereby enables DDI's to be moved between network operators. However, the obvious limitation to this is that, should there be a major failure in the 'originating exchange' then calls to DDI's that have been ported from this exchange may not be capable of being re-routed. As a result, calls may not reach the new network and the caller will receive a 'number unobtainable' or similar tone.

Therefore, it doesn't matter how resilient either the original network operators' service may be, or how robust and resilient the new network will be. In all cases, where DDI's are ported between networks then this Single Point of Failure in the originating telephone exchange is introduced. This is a design limitation in the architecture of the PSTN and is unlikely to change for the foreseeable future.

## 3 Network Block Transfers

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An alternative way to migrate DDI's between carriers, and which avoids the single point of failure, is to transfer these DDI's using a 'network block transfer'. With a network block transfer, entire blocks of DDI ranges are able to be moved between networks and between carriers without calls re-routing via the originating exchange. This eliminates the Single Point of Failure. However, while this provides a highly resilient solution to the problem of DDI migration, network block transfers are reserved only for organisations with an entire 10,000 DDI number block. Therefore for organisations wishing to provide full resilience and control of their DDI range it may be necessary to use new DDI numbers that were originated in the smartnumbers service itself.



## 4 Best Practices in DDI Adoption

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smartnumbers recognises the organisations are very reluctant to adopt new DDI's, especially where the existing DDI's are mission-critical or have been in the public domain for a long time. The steps that smartnumbers recommend to support the easiest migration to new DDI's are as follows:

1. Ensure the new block of smartnumber DDI's are as close to the original DDI range as possible. Ideally, the first 3 digits and the last 4 digits of both the original and new DDI ranges will be identical.
2. Inform callers that you have moved to new DDI's. It's a good reason to get in contact with callers that you speak to frequently, as well as those that you may not have contacted for some time. You can use this migration to 'sell' the benefits of the move to new numbers, which in the case of smartnumbers will be the increased resilience that these new numbers offer.
3. Ensure that web-sites, business-cards and other stationary reflect these new DDI numbers.
4. smartnumbers will be configured so that calls to both the original DDI's and to the new DDI's will be handled identically. As such, calls to either number range will be delivered into the corporate voice network.
5. Once the company is satisfied that calls to both the new and original DDI's will be delivered, smartnumbers can automatically inform callers that the number has changed, to tell callers what this new number is, but still continue to connect the call. As such, callers will be connected without having to re-dial.
6. smartnumbers will provide a weekly call report showing calls made to both the original DDI's and to the new DDI's. This report will show a steady decline of callers using the old numbers and a steady uptake of callers using the new numbers.
7. The above can be the status quo for many months or even years. Calls to the old range will continue to be connected, but at each call the caller is advised to using the new DDI next time. Eventually only a very small percentage of callers will ever use the old DDI's.
8. At some point, you can choose to either stop connecting calls to the old DDI range entirely, to ask customers to stop and re-dial this number, or to continue connecting calls as the business requires. This will be a business imperative, and smartnumbers will support whatever is considered the most appropriate solution for the business.