



Office of the Director of
**Telecommunications
Regulation**

RESPONSE TO CONSULTATION

Network Resilience

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Foreword

The significant levels of traffic which are passing through interconnected networks, the increasingly complex customer relationships which exist and the quality of service to consumers in the telecommunication sector are all heavily dependant upon the quality of service provided by interconnected networks. To ensure that consumers have an appropriate level of assurance of the continuity of the service being provided, it is important that individual and interconnecting networks demonstrate significant resilience.

The recent consultation paper on Network Resilience has been responded to by several operators expressing similar views and it is clear from these responses that the issue of network resilience should be addressed.

This report on the consultation has identified a number of issues, such as the importance of the reliability of “any to any” traffic, the opportunities for improving network resilience through increased inter-operator communication and the importance of introducing of resilient interconnection products into the RIO. This report outlines how I propose to move these issues forward with the support of the industry.

Etain Doyle,

Director of Telecommunications Regulation.

1 INTRODUCTION

One of the key benefits of competition is that consumers can enjoy greater choice of services and operators. At a more fundamental level it is critical that consumers can have an appropriate level of assurance as to the continuity and security of the service being provided whether it is a fixed, mobile or data service. With the expansion of network interconnectivity, interoperability of networks becomes increasingly important, particularly having regard to the overall resilience of networks and assurances around the continuity of quality services. Therefore resilience is an issue not just for individual networks but is also an issue for the industry as a whole as there is an increased potential for problems arising from the interdependence of networks. This includes, for example, the interrelationship and interconnectivity between mobile and fixed networks. It is from this perspective that the issue of resilience is important in regulatory terms.

The consultation on resilience, ODTR Document 01/77 focused on a number of issues with the purpose of:

- assessing what network resilience is and why it is important;
- examining ways in which network resilience can best be assured;
- assessing, at a general level, the existing arrangements for ensuring network resilience;
- exploring whether further action at a regulatory or operator level may be required including, for example, greater co-operation between operators.

Five operators responded to this consultation, and this report on consultation compiles the views of these respondents and outlines the Director's position in relation to points raised by these respondents and the next steps involved to improve network resilience.

The five operators who responded to this consultation are:

- *eircom* plc.
- Eircell Vodafone
- Esat Digifone
- Esat Group (Esat and Ocean Communications)
- WorldCom

The Director wishes to express her thanks to everyone who contributed to the consultation. With the exception of the material marked as confidential, the written comments of respondents are available for inspection at the ODTR's office in Dublin.

1.1 Legal background

Under current EU and Irish legislation operators have obligations to protect their networks and ensure service to users is maintained. The Director of Telecommunications Regulation has a range of powers to ensure networks and services are protected by operators. The most relevant legislation pertaining to these powers is;

- European Communities (Interconnection in Telecommunications) Regulations, 1998, SI No. 15 of 1998, Regulations 10 and 11.

Regulation 11 – Essential Requirements

(6) The Director may impose conditions in interconnection agreements—

(a) in order to ensure interoperability of services, including conditions designed to ensure satisfactory end-to-end quality of service and conditions imposed under this regulation may include implementation of specific technical standards or specifications or codes of conduct agreed by operators in the telecommunications market, or

(b) in order to ensure the protection of data to the extent necessary to promote compliance with relevant regulatory or statutory provisions on the protection of data including protection of personal data, the confidentiality of information processed, transmitted or stored and the protection of privacy.

- European Communities (Leased Lines) Regulations, 1998, SI 109 of 1998, Regulation 4, 9, 10 11, 14.
- European Communities (Voice Telephony and Universal Service) Regulations, 1999, SI No. 71 of 1999, Regulations 3, 9, 16 and 17

Regulation 17 - Conditions of access and use and essential requirements.

(1) (a) A fixed operator which is designated under Regulation 4 shall not interrupt, terminate, significantly vary or reduce the availability of services to organisations providing telecommunications networks or services except in accordance with procedures for this purpose laid down by the Director.

(3) The Director may issue directions to a fixed operator identifying those cases where access to or use of fixed public telephone networks or fixed public telephone services, or both such networks and services, may be restricted on the basis of essential requirements specified in Article 13.2 of the Directive and Article 3(5) and 5(3) of Directive No. 90/387/EEC.

- Postal and Telecommunications Services Act 1983, SI No. 24 of 1983, Section 111.
- Relevant licence Conditions in the Mobile, GTL and BTL.

2 Network Resilience

2.1 Why protection is necessary

2.1.1 Summary of the Consultation Topic

Modern telecommunications networks are complex systems that are vulnerable to a range of failures or unusual patterns of calls. Unusual demand profiles may result from failures in other networks or external events such as a major disaster or tele-voting. Failures can result from a variety of reasons ranging from software problems to catastrophic external events such as fire.

Problems can occur with varying probability and can impact the network in different ways. Network designers have to plan their network to manage situations where a failure or a combination of two or more failures occurs due to unusually high demand or problems arising from other sources.

Without adequate protection mechanisms, such as network resilience, to mitigate the impact of these failures, services to users may be seriously impacted or disconnected at what could be a major cost to the user.

Q. 1. Respondents are invited to comment on the above. Are there other significant circumstances that pose a threat(s) to continuity of service on a national or more localised basis? If so please explain

2.1.2 Views of Respondents

All operators agreed with the broad outline of circumstances that pose a threat(s) to the continuity of service. Four operators provided further comments.

One operator commented that in order to effect resilience, alternative infrastructure must exist in order to allow traffic to be transported over diverse routes. This operator considers the regulatory environment as one of the most significant determinants of whether a clear commercial opportunity exists for providing alternative infrastructure and whether the right economic conditions exist in order that an operator can recoup the costs. Furthermore this operator considers a regulatory environment that promotes “virtual” services over a single platform or one that interferes excessively, as a risk that may impact on the competitive balance of supply and demand.

Two operators listed a number of extraordinary items that may affect network resilience.

1. Global Events, such as September the 11th

2. Industrial Action
3. Terrorism/Related
4. Seasonal/Weather threats
5. Vandalism or malicious Damage
6. Loss of internal revenue systems
7. News of free calls

Taking all these considerations into account, one of these operators stated that there should be ODTR approved action plans to protect networks from unexpected overload.

With regards to other threats, two operators drew attention to the fact that interruptions to their transmission systems have a far greater potential to disrupt continuity of service than failures in individual voice or data platforms. This is due to the fact that in most networks, the transmission layer can carry several services at once and hence a failure at this level can impact on the overall availability of the operator's network. One operator believed that poor planning and design of networks and transmission systems is the main cause of outages in Ireland today.

The final comment in this section was made by one operator who was of the opinion that Ireland lacks a rich set of interconnect arrangements as evident from the volume of non-SMP traffic to and from mobile operators that transits via eircom. Furthermore this operator believes that OLOs are totally dependent on eircom for the provision of “any to any” type traffic services.

2.1.3 Position of the Director

From the views of the respondents the Director is satisfied that she had outlined in broad terms the circumstances that pose a threat (s) to network resilience and will use the remainder of this section to answer the specific issues raised by the respondents.

With regards to the provision of alternative infrastructure, the Director points out that the regulatory environment takes account of investment costs and must also eliminate significant barriers to entry.

The Director agrees that the majority of the extraordinary items mentioned by the respondents can pose a threat (s) to continuity of service and considers that there should be action plans to protect networks from unexpected overload. In the case of network protection from overloads and effective inter-operator communication, the Director believes that consumers and industry can benefit from cross-industry standardisation which could be achieved through an appropriate forum, such as the Resilient Working Group, as discussed in section 4.3 of this report.

The Director does not view the loss of internal revenue systems as an event that allows operators to restrict services in order to provide network resilience. There is a clear incentive to protect internal revenue systems from failure and to correct any problem, but to restrict services in this case would be improper and resilience would not be the foremost concern.

With regards to the threat posed by interruptions to transmission systems, the Director concurs that this is a considerable threat to network resilience and consequently a substantial part of this consultation discussed options to improve physical resilience. These options are discussed in section 4 of this report.

The Director notes the substance of the point that poor design of networks and transmission systems may be a considerable threat and therefore she believes that standards and conditions for the delivery of traffic through an operator's network, as discussed in section 4.4, may be the most appropriate method of minimising this threat.

The Director supports the request for a richer set of interconnect products, and encourages operators to be less dependent upon eircom for transiting of calls. This may be achieved, for example, through increased use of direct interconnection between fixed and mobile operators. The ODTR is available to facilitate such discussions should direct approaches fail. Furthermore the ODTR is available to develop outline templates for such agreements should this be considered useful.

2.2 Approaches to Providing Protection

2.2.1 *Summary of the Consultation Topic*

The paper concentrated on approaches aimed at mitigating the impact of a problem whilst it is occurring. The methods of providing resilience are similar for both internal and external events, but differ in detail. Essentially there are two approaches. First is the ability to use equipment that is deliberately kept as backup, or is otherwise unused at the time of the fault, as efficiently as possible to circumvent the problem. Second, if the first cannot be done, is to contain the problem so as to prevent the effects from spreading.

Q. 2. Do you consider that there are there other approaches to providing network protection? If so please outline?

2.2.2 *Views of Respondents*

One Operator noted that the cost of spare capacity has to be balanced with the service that is provided. The operator suggested that if forecasting of traffic was broken down into various traffic forms then it would be better able to plan the core network.

One operator pointed out that the further co-operation between industry players, particularly in relation to the information between Network Management Centres may be used to pro-actively mitigate the network resilience threats caused by steep traffic increases. Another operator suggested that operators should consult cable route drawings when carrying out excavation/digging work, while another operator suggested that agreed processes on call gapping or blocking might be an effective way of providing resilience.

Three operators were of the opinion that resilient interconnects is an approach that can be used to provide extra resilience, while four operators made reference to network resilience for “any to any” traffic, and the dependence of OLO’s on the incumbent operator’s network.

One operator suggested that effective SLAs can be used in order to provide extra network protection. Another operator suggested that operators should have to show proof of resilience and duct diversity.

The final comment received was that one operator suggested that the use of standard practices would aid network resilience and cited duplication of power supplies, well-designed and well manufactured equipment, self-healing SDH rings and diversity as areas that where standard practice could be used.

2.2.3 Position of the Director

Considering the number of other approaches to providing network protection submitted by the respondents, the Director agrees that resilience can be provided in many ways.

With regards to forecasting of traffic, the Director feels that forecasting a breaking down of traffic into various traffic types may be too prescriptive, although it is noted that improved communication and co-operation in the area of forecasting between network operators may facilitate better network planning.

Further co-operation between industry players in relation to information transferred between Network Management Centres is encouraged by the Director, provided that Competition rules are not breached. In section 4.3 of this paper, views in relation to the need for an industry co-ordination forum are discussed. Such a forum could be used to facilitate inter-operator information transfer.

Mechanisms such as call gapping or blocking may be an effective way of maintaining resilience but only under specific circumstances. The Director would encourage an agreed process by which call gapping or blocking could be implemented but adds that such solutions should abide by the numbering conventions and other relevant legislation.

The Director notes that OLOs have a high level of dependence upon eircom’s network and hence that a significant amount of “any to any” traffic passes through eircom’s network. Given the importance of this traffic to OLOs and eircom’s obligations under its designation as having Significant Market Power (SMP) in the fixed services and networks markets, the Director notes eircom’s obligation to treat “any to any” traffic in a non-discriminatory manner.

For the purposes of clarification, the Director’s understanding of “any to any” OLO traffic is traffic that is delivered all the way through an interconnected network to its destination (either termination or transit), and not just traffic that is transmitted over the interconnect links. “Any to any” traffic may also refer to traffic that originates and terminates in the same network.

The Director believes that the provision of proof to the office of individual operators’ resilience and duct diversity may not be the most appropriate method of ensuring that networks are protected. The Director considers that the introduction and definition of resilient interconnect products is more appropriate and this issue is address in section 4 of this report.

Regarding the use of standard practices the Director agrees that this would aid network protection and believes that operators should employ best practice.

2.3 Commercial Concerns

2.3.1 *Summary of the Consultation Topic*

There is a clear commercial incentive for operators to pay adequate attention to protecting their own networks, while bearing in mind that a balance needs to be struck between the cost of protection and the likelihood and potential impact of the failure. In an ideal world, operators and their customers would agree the level of protection required and the charges that would apply. Some customers do require assured service, others will be happy to buy a lower cost service with no guarantees. In a fully competitive market different product offerings are likely to be developed to cater for necessarily different needs. However the telecommunications supply industry does not yet have this level of choice and so average expectations are considered.

Q. 3. Do you consider that the level of protection as currently offered is sufficient to protect customers’ interests?

Q. 4. What do operators consider to be best international practice for network resilience? Do operators comply with that standard?

2.3.2 *Views of Respondents*

Three operators believe that their own network complies with international standards, but added that the overall service which a user experiences can depend upon interconnected networks.

In total four operators drew attention to the importance of third party networks and the fact that this can impact the quality of service provided by an operator to its customers, as the operator has to rely upon the assurances of the third party carriers. One operator highlighted the level of reliance upon the third party carriers for direct connectivity to its customers.

One operator stated that different operators have different standards for “resiliency” as this standard is driven by the operator’s customers. Therefore it is not possible to define a specific level of resiliency as standard.

One operator noted that customers’ expectations are increasing all the time and it is their belief that industry network availability needs to be improved to meet this.

One operator is of the opinion that the free market is the best mechanism for judging operator’s best practice in terms of resilience versus costs.

One operator is of the opinion that different levels of resilience in the network need to be defined for the different network layers.

One operator views the current level of resilience as being sufficient. Another operator believes that customers in Ireland should be provided with the international standards of resilience as a minimum.

For “any to any” traffic, one operator does not agree that the level of resilience is sufficient. Additionally one operator stated that it is necessary that a clearly defined industry standard of network resilience is employed by all. Finally one operator highlighted the importance of availability, as the failure of third party carriers to meet network availability assurances has a significant impact on customer confidence and service level guarantees provided.

2.3.3 Position of the Director

In general the Director notes that interconnection is of greater importance to OLOs, and that while operators may view their own network resilience as being sufficient the Director considers that the provision of traffic via interconnected networks may be susceptible to resilience issues.

The Director agrees that there are different “resiliency” standards for different operators, as customers set demand, and that the free market mechanism of supply and demand can provide appropriate signals to operators to invest in resilience. However, this investment may be concentrated internally in the operators’ own network and not in the external connections. As the number of operators increases, the importance of interconnection between networks also increases.

Taking the importance of interconnection and resilience to operators, the Director intends to set-up an industry-wide Resilience Working Group in March 2002 to specifically address the inter-operator communications issues raised by operators in this consultation which affect network resilience. Further details of the scope of the Resilience Working Group are outlined in section 4.3 of this report.

3 Existing industry arrangements

3.1 Infrastructure Resilience

3.1.1 Summary of the Consultation Topic

Summary: Infrastructure Resilience: General, Power, Network Management, Switched Networks

The telecommunications infrastructure in Ireland appears to be capable of continuing to provide service (although possibly at a slightly degraded level) in the event of a single failure or traffic surge. As indicated earlier, rather less thought appears to have gone into considering the implications of multiple networks and possible multiple failure. The ODTR's particular concerns are as follows:

- The tendency to plan for only a single failure (or event) in the operators own network.
- The apparent lack of information passing between operators - especially those not directly connected with one another (e.g. transiting via eircom).
- The reliance on a single network for the majority of interconnectivity (eircom).
- A low level of resilience in inter-network links.
- The potential susceptibility of eircom's network to failures of external networks producing major changes in traffic flows.

<p>Q. 4. Do you agree with the above analysis?</p>

3.1.2 Views of Respondents

Four out of the five operators agreed with the main analysis of this section but added the following

- Two operators did not believe that there is sufficient level of resilience in the eircom network as highlighted by the number of high profile outages. In particular these operators are concerned about single points of failure.
- One operator stated that there are more customer relationships than those outlined in this section – operator, reseller, and consumer. This operator also agreed that a number of single points of failure can impact upon the overall resilience offered to the end consumer.
- One operator pointed out that it caters for multiple failures.

One operator only agreed with the final part of this section and also listed a number of other factors that should be taken into consideration:

- Lack of forecasting information can lead to lower network resilience as the current forecasting methods do not lend themselves to planning for network failures.
- Best practice is possible when the industry environment is co-operative.
- Network resilience must be considered on multiple layers - switching/signalling/transport etc. Planning for "numbers" of failures should be relative to their likelihood of occurrence. Planning for multiple failures of switching cores with availability figures of 99.99% would seem largely unnecessary, whereas planning for multiple transmission faults, prone to external factors, would be far more appropriate.
- Significant investment in infrastructure, which is not encouraged by the current interconnect regime, would reduce the reliance upon the SMP operator.

3.1.3 Position of the Director

The Director is satisfied that in general her analysis of the situation is correct as four out of the five respondents agreed with the main thrust of this section.

With regards to the specific points raised by these four respondents, the Director is aware of a number of high profile outages which were caused by a range of events. The Director continues to require operators to advise the office of the circumstances of such events and actions taken to mitigate against future occurrences.

The Director notes operators concern about single points of failure and is also aware that more complex customer relationships exist and that a service provider can be reliant upon multiple carriers to provide network solutions to its customers. While a single point of failure in any of the multiple carriers may cause a break in continuity of service to a customer the Director believes that the probability of this occurring may be reduced via resilient interconnect products as discussed in section 4 of this report.

With regards to the specific points raised by the operator who disagreed with the main points this section;

The Director believes that forecasting and information flow have the possibility of improving network resilience. The level of information flows can be discussed at industry forum meetings such as the O&M forum. As stated previously the Director feels that breaking down of traffic into various traffic types for forecasting may be too prescriptive but notes that improved communication and co-operation in the area of forecasting between network operators may facilitate better network planning.

The Director understands the need for network resilience planning at multiple layers, and believes that this is common practice, as higher levels in the network carry more traffic and therefore require more protection.

With regards to the provision of alternative infrastructure, the Director points out that the regulatory environment takes account of investment costs and must also eliminate significant barriers to entry.

3.2 Other Risks

Q. 5. Are there other risks that need to be considered?
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3.2.1 Views of Respondents

One operator considered that the inappropriate use of number ranges, particularly those of using non-bursty numbers for bursty traffic, as a risk.

Another operator stated that the customer relationship may imply that a consumer may rely upon a service that has a number of single points of failure, i.e. a reseller may sell a service to a consumer but may be interconnected to an operator through a leased line. This operator may then be reliant upon the SMP operator for the transport of this call. Generally this refers to the network interoperability resilience.

3.2.2 Position of the Director

With regards to the inappropriate use of non-bursty type traffic for bursty numbers, the Director believes that operators should comply with the numbering conventions.

The Director understands that there may be a number of single points of failure in the situation where a reseller sells a service to a consumer but is interconnected to third party networks for completing this call. To an extent this is the nature of today's business. The Director believes that further, more complicated relationships may exist in the future and therefore seeks to minimise this risk through the next steps which is outlined in section 5 of this report.

3.3 Current Measures

Q. 6. Are current measures adequate to guard against these risks?
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3.3.1 Views of Respondents

One operator stated that centralised network management function allows swift response but added that this response however may not always be swift enough to avoid impact to the customer.

One operator was of the opinion that this question is subjective and that all operators networks are resilient to a degree. However the key to this question is that a balance needs to be struck between quality of service offered to a user via network resilience and commercial profitability. This operator believed that the free market dictates an operator's decisions in the first instance with the exception of the SMP operator which carries additional responsibilities and therefore requires additional safeguards.

One operator suggested that a review of the offerings from the SMP operators to interconnected operators would be a mechanism to reduce the current risks and particularly the single points of weaknesses.

3.3.2 Position of the Director

The Director agrees that a swift response from a centralised network management function may help to minimise degradation of service. Furthermore she believes that improved inter-operator network management centre (NMC) communications should minimise the impact which a degradation of service can have upon another operator's network, and believes that the Resilience Working Group can address such issues.

The Director agrees that the SMP operator carries additional obligations, but points out that OLOs must also provide resilient links to their end customers in order to supply end to end resilience.

With regards to reviewing the offerings from the SMP operators to interconnected operators the Director intends to review these offerings via a consultation on the RIO in March 2002.

4 Options to improve situation

4.1.1 Summary of the Consultation Topic

The ODTR believes that in general commercial factors should be sufficient discipline to ensure that adequate protection is provided to an operator's own retail customers. However for the reasons set out in the introduction to this paper, the ODTR is concerned that certain matters of a cross-industry impact need fuller consideration.

**Q. 7. Under what circumstances may commercial factors be insufficient?
Should ODTR audit performance?**

4.1.2 Views of Respondents

Three operators believed that in some circumstances the ODTR should audit performance, while two operators believed the ODTR should not. These operators also provided further comments to this question.

One operator suggested that regulated auditing of network performance may be a means of ensuring that there is transparency and equality of offerings to all operators. This operator also stressed that an SLA that does not have sufficient penalties may not encourage operators to abide by the terms of the SLA.

Another operator believed that it is unnecessary to continually audit performance and that this should only be carried out where formal complaints are received from operators.

One operator suggested that the ODTR should be pro-active and require eircom to set-up a contact team which will be free to liaise with OLOs on service affecting problems. Another operator commented that intrusive regulation may cause market failure that commercial factors cannot resolve, while another operator believed that regulation is only required for inter-operator issues and that commercial factors should be sufficient for individual network resilience.

One operator considers that there has to be a balance between quality of service, and cost of a service. This may lead to the provision of premium interconnect products which have higher prices due to additional protection.

Finally one operator believes that there are insufficient interconnect products available while another operator was of the opinion that clear and unambiguous resilient service offerings should be provided in the RIO.

4.1.3 *Position of the Director*

Considering the mixed views of the respondents the Director considers that initially it should not be necessary to audit performance. However she may perform an audit at a later stage if the level of service deteriorates. The Director notes the comment in relation to intrusive regulation and aims to avoid this. However, if the circumstances arise where intervention is required she is prepared to carry out the necessary action. It should be noted that current monitoring of the availability of interconnect links is available through the Measuring Licenced Operator Performance (MLOP) programme.

With regards to the cost of resilient services, the Director agrees that a balance between quality of service and cost of service has to be struck. It is therefore understandable that premium interconnect products with additional protection will necessitate a higher price. However this price should abide by the appropriate costing principles.

4.2 **Discrimination in the event of abnormal events**

4.2.1 *Summary of the Consultation Topic*

Discrimination by an SMP operator between its downstream retail divisions and OLO's seeking interconnection is illegal. This should be the case whether or not an abnormal event is occurring unless discrimination is necessary to protect network integrity or is a direct result of a failure by the OLO.

Q. 8. Do you agree that existing measures avoid discrimination whilst adequately protecting network integrity?

4.2.2 *Views of Respondents*

For the most part, the respondents agreed that the existing measures were adequate and one operator suggested that this may not be an issue in the future as operators sell off their downstream businesses. Other comments received were as follows:

One operator felt that this question undermined them and was pejorative.

Another operator reinforced their opinion that the ODTR should be more proactive in this area.

Two operators expressed concern about discrimination and one of these operators cited the example of 1892 and 'near end handover only' as a form of discrimination. Another operator emphasised the importance of "Chinese Walls"

within large telecommunications organisations in order to protect network integrity.

One operator commented that operators may need to restrict un-forecasted bursty traffic in order to protect their network.

4.2.3 *Position of the Director*

Considering the views of the respondents, the Director considers that existing measures avoid discrimination whilst adequately protecting network integrity. However the Director understands the importance of the issue of discrimination and will continue to monitor operator compliance and the effectiveness of “Chinese Walls”. Her commitment to ensuring non-discrimination is evident from the ongoing CPS call routing investigation which resulted from the dispute resolution determination number 01/01.

With regards to the other comments received, the Director stresses that network operators and service providers are expected to make all efforts to ensure that traffic of a bursty nature is confined to the appropriate numbers, taking steps if necessary against persistent offenders who repeatedly apply bursty traffic to unapproved numbers, without prior agreement as specified in the Numbering Conventions. Finally the Director adds that her own initiative investigation powers ensured that there is no discriminatory routing for the 1892 code, as following her direction handover is to be available at all interconnection points specified in the RIO.

4.3 **Co-ordination**

4.3.1 *Summary of the Consultation Topic*

ODTR believes that consumers and industry as a whole would benefit from greater exchange of information requiring network management intervention. This would be necessary during both the planning stage and when actionable events are occurring. ODTR believe that a sub-group of the O&M forum may be an appropriate mechanism to provide this co-ordination.

Q. 9. Do you agree with the need for an industry co-ordination forum? If so what should be included in its terms of reference?

4.3.2 *Views of Respondents*

Three operators believe that there is no need for an industry co-ordination forum, commenting that

- existing processes and contact points in the O&M manual are suitable

- the completion of tasks through the current working groups would circumvent the need for a forum and
- that many issues tend to be short-lived and resolved through bilateral agreements rather than O&M forum agreements.

One operator believes that more network infrastructure information should be shared between operators and that a specific team should be set-up to pro-actively deal with any OLO network issues.

Two operators believe that the O&M forum is an appropriate mechanism and one operator comments that the group should pre-define various levels of alert status depending on incident severity, standard levels of traffic gapping etc. and a communications mechanism in the event of disaster.

4.3.3 *Position of the Director*

From the responses to this section, the Director notes that the majority of operators are reluctant to form an industry co-ordination forum believing that the current communication channels allow operators to discuss existing practices and processes either bilaterally or through working groups. The Director is aware of the commitment required by operators at these forums but also notes that all of the respondents throughout this report have at different stages drawn attention to the fact that there is scope for increased inter-operator communication which can lead to improved overall network resilience.

Taking both of these points into consideration the Director intends to set-up a Resilience Working Group with specific terms of reference which contain the inter-operator communication issues that were raised by the respondents throughout the report. The Director believes that this working group should have a short-term life and that the issues which this working group will deal with are:

- Operators may choose to define resilient interconnection links and appropriate definitions
- Examination of appropriate SLAs for resilient interconnection links
- How to improve Inter-Operator communication flows
 - Network Management Centre communication when network resilient affecting events occur
 - Pre-definition of various levels of alert status depending on incident severity
- Can standardised practices be used
 - Use of standards for traffic call gapping,
 - Use of standards to ensure equipment diversity and reliability,

4.4 Service Level Agreements

4.4.1 Summary of the Consultation Topic

The ODTR is of the opinion that SLAs within interconnection agreements would be an appropriate mechanism for ensuring that interconnection providers and seekers achieve adequate clarification of protection arrangements in place. This would include penalties for failure to meet obligations. This is attractive technically and economically. Technically, operators can plan with greater certainty; economically operators can consider better the true cost of failure and plan accordingly.

ODTR recognises that responsibilities exist in both directions. Interconnection providers can expect accurate information for planning purposes and should have the right to ensure that access seekers do not export their problems. Access seekers should expect that their traffic streams are adequately protected.

ODTR believes that operators should in the first instance attempt to develop an appropriate framework that is of mutual benefit. If this process fails, ODTR notes its willingness to intervene and impose changes that might be necessary.

- Q. 10. Do you believe that SLAs or specific terms and conditions around in-service performance are a useful mechanism for ensuring adequate protection?**
- Q. 11. If not, what other mechanisms might be appropriate? If yes, how might SLAs be created/modified? Also if yes, what process and timescales would be appropriate for developing the new framework?**

4.4.2 Views of Respondents

Four operators responded to this question.

Two operators agreed that SLAs (or specific terms and conditions) were a mechanism by which adequate protection can be assured.

One operator expressed the opinion that ‘guidelines’ as opposed to a SLA on operational, technical or network resource issues be used, as ‘guidelines’ would not form a barrier to entry for new operators in the market.

One operator believed that SLAs were not the best choice as installation of network protection was often a ‘once off’ job. The O&M manual should contain the provisions for best practice in relation to resilience for all operators and not just SMP operators. Adherence should be enforced through the ODTR’s dispute resolution procedures.

With regards to the specifics of a SLA;

Two operators suggested that SLAs should be formulated based upon end users' SLAs

One Operator added that an availability percentage and monitoring system for each level of the network should be agreed between eircom and OLO's. However this operator was concerned that such an SLA may take years rather than months to fully implement and thus commented that a significant commitment from the ODTR would be required. Penalties should be formulated in such a manner to provide the proper impetus to all parties.

The other operator stressed that a standard set of understood network definitions is essential to form SLAs.

One operator noted that a binding SLA with regards to network availability ("any to any" traffic) is required to ensure quality of service for interconnecting traffic.

4.4.3 Position of the Director

As above, considering the mixed views of the respondents, the Director sees some merit in having SLAs as a mechanism to provide adequate protection. However the Director feels that industry communication in the first instance may be the most appropriate means of specifying the parameters for a SLA and that the Resilience Working Group can address this issue.

With regards to the specifics of the SLAs, the Director notes the comments of the operators and will take these into consideration in the Resilience Working Group discussions.

4.5 Interconnection Links

4.5.1 Summary of the Consultation Topic

The ODTR believes that interconnection links must be available that allow adequate protection in the event of failures in the transmission path. The ODTR is not yet convinced that this is done cost effectively (for example self-healing rings are not supported) and believes that there are circumstances where OLOs are disadvantaged. In particular, ODTR feels it is necessary to define a resilient interconnection product that better meets market needs.

ODTR would expect SMP operators to respond to requests for such a product quickly. It would also be willing to intervene directly if progress was not occurring or conflicting requests were received.

- Q. 12. Do you agree that there is a need to review the resilience of interconnection links? What concerns do you have in this regard? What protection might be necessary for each party?**
- Q. 13. Do you agree that access seekers should prepare product definitions in the first instance?**

4.5.2 Views of Respondents

Most operators stated that there was a need to review the resilience of interconnection links, even though one operator stated that by availing of the terms of the RIO an operator can achieve network protection, resilience and diversity.

One operator commented that ISI resilience is not a standard and that CSI is not a resilient offering and therefore requested that

- ISI offerings should be extended to include resilience as standard
- Standard resilient transmission and entry to OLO node for CSI at transparent costs
- OLO's own fibre via ISI can be used to interconnect.

One operator stated that resilient fibre routes and resilient network equipment with guaranteed site access is required. One operator's primary concern was that operators could be asked to pay for network resilience without assurance that single points of failure were not present.

One operator believes that the current model for interconnect is cost effective and stated that, with the mix of switching and transmission solutions currently available in the RIO, it is possible to achieve a very high level of network resilience. This operator also pointed out that a resilient offering may involve the use of dedicated and diverse transmission infrastructure which is unutilised except in the event of a failure. This operator therefore believes that the current model where resilience is effected through inter-switch routes is efficient as the costs are shared across multiple services and operators.

One operator commented that it should be mandatory for an interconnecting operator to interconnect at lower levels in the network once they reach a certain level of traffic and that the onus should be on the originating operator (exception is free phone traffic) to ensure network resilience in their interconnection links as this operator via the collection of retail revenues has the most to gain through increased network resilience.

Two operators made the comment that the ODTR has already reduced resilience on interconnection by allowing single 2 Mbit interconnection links.

With regards to the preparation of a product definition by access seekers in the first instance three operators replied to this question and these operators stated that it would be appropriate for access seekers to define product definitions once clearly defined network resilience standards and requirements exist. One operator also added that they would expect their product definition to have some bearing on the eventual product offered.

4.5.3 Position of the Director

The Director understands that under the current terms of the RIO, operators may avail of inter-switch diversity, by having interconnection routes to and from more than one node, in either the originating or terminating network. However the Director is also aware that not all OLOs will have infrastructure available for such strategies. Therefore considering the views of the respondents the Director believes that there is a need for resilient products to be included in the RIO. The Director encourages operators to submit a reasonable request to eircom for resilient interconnect links to be included in the RIO.

Before submitting a request for resilient interconnection links, operators may define this product on an individual basis or on a collective basis. If operators choose to define a resilient interconnect product on a collective basis, then operators may choose to define this in the Resilience Working Group.

With regards to the preparation of a product definition, such as a resilient interconnect product, the Director believes that input from access seekers in the definition phase can assist in the effective development of the end-product. Operators may choose to use the Resilient Working Group to prepare such a definition.

5 Next Steps

From the views of the respondents to this consultation, the Director has decided that a number of actions are appropriate to improve the situation with regards to network resilience.

First and foremost, it is clear from the respondents that there is a need for a resilient interconnect product in the RIO, as the current regime facilitates only inter-switch resilience. The Director encourages operators to submit a reasonable request to eircom for resilient interconnect links to be included in the RIO.

Reasonable requests may be submitted on an individual or industry-wide basis. If operators choose to submit an industry-wide request for a resilient interconnect product to eircom, then operators may choose to define this product in the Resilience Working Group.

With regards to SLAs, the Director feels that industry communication in the first instance may be the most appropriate means of specifying the parameters for a SLA. The Director believes that the Resilience Working Group is an appropriate industry group to examine this issue.

Finally, given the level of interest in ensuring resilience expressed by respondents in this consultation, the Director intends to set-up a Resilience Working Group in March 2002 with specific terms of reference encompassing the inter-operator communication issues that were raised by the respondents throughout the report. This issues which this working group will address are:

- Operators may choose to define resilient interconnection links and appropriate definitions
- Examination of appropriate SLAs for resilient interconnection links
- How to improve Inter-Operator communication flows
 - Network Management Centre communication when network resilient affecting events occur
 - Pre-definition of various levels of alert status depending on incident severity
- Can standardised practices be used
 - Use of standards for traffic call gapping,
 - Use of standards to ensure equipment diversity and reliability.