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**Distribution  
Companies'**

**Incident Reporting  
Systems**

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**Interim Review  
Final Report**

**March 2002**

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# Distribution Companies' Incident Reporting Systems

Interim Review  
Final Report

March 2002

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# Distribution Companies' Incident Reporting Systems

## Issue and Revision Record

<b>Rev</b>	<b>Date</b>	<b>Originator</b> (Print) (Signature)	<b>Checker</b> (Print) (Signature)	<b>Approver</b> (Print) (Signature)	<b>Description</b>
A	November 2001	I. Boira-Segarra	G. Stott	S.C. Harrison	First Issue
B	November 2001	I. Boira-Segarra	S.C. Harrison	S.C. Harrison	Second Issue
C	December 2001	I. Boira-Segarra	G. Stott	S.C. Harrison	Third Issue
D	January 2002	I. Boira-Segarra	G. Stott	S.C. Harrison	Fourth Issue
E	January 2002	I. Boira-Segarra	G. Stott	S.C. Harrison	Fifth Issue

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## **Glossary**

ACD	Automatic Call Distribution System
BPI	British Power International
BT	British Telecom
C&W	Cable and Wireless
CC	Control Centre
CIS	Customer Information System
CLASS	Call Logging and Sorting System
CORGOS	Electronic system developed by EME
CLI	Caller Line Identification
CMS	Call Management System
CNDB	Central Network Database
CROS	Control Room Operating System
CS	Customer System
DBD	Distribution Business Documentation
DCC	Distribution Call Centre
DMS	Document Management System
DSTs	Distribution Supply Technicians
DUOS	Distribution Use of System
EA	Electricity Association
EME	Eastern Midlands Electricity Distribution
ENMAC	Electricity Network Management and Control System
FMS	Fault Management System
GAM	Group Announcement Message
GIS	Geographical Information System
GND	Geo-schematic Network Diagram

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HV	High Voltage
ICM	Intelligent Call Management
ICOND	Integrated Control Operational Network Diagram
IIP	Information and Incentives Project
IFRS	IIP Fault Reporting Systems
IRIS	Incident Reporting and Information System
IVR	Interactive Voice Recording
IT	Information Technology
IVP	Interactive Voice Processing
IVR	Interactive Voice Response
LLF	Line Loss Factor
LPN	London Power Networks
LV	Low Voltage
MAS	Managed Answering System
MM	Mott MacDonald
MMS	Micro Mapping System
MPAN	Metering Point Administration Number
MPRS	Metering Point Registration System
MTC	Meter Timeswitch Code
NaFIRS	National Fault and Interruptions Reporting Scheme
NCAS	New Connections Systems
NEDL	Northern Electric Distribution Ltd.
NMS	Network Management System
NPL	Network Property Link
OS	Ordnance Survey
PC	Profile Class
PODs	Power Outage Detectors

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PROSPER	Power Systems Performance Reporting
RDU	Resource Despatch Unit
RIGs	Regulatory Instructions and guidance
SCADA	Supervisory Control and Data Acquisition
SCS	Secondary Control System
SE	SEEBOARD Power Networks
SIMS	Supply Incident Management System
SIRS	Short Interruptions Reporting Scheme
SP	Scottish Power
SSC	Standard Settlement Class
SSE	Scottish & Southern Energy
TCW	Trouble Call World
TCS	Trouble Call System
TMS	Trouble Management System
TXUED	Texas Utilities Electricity Distribution (ex Eastern Electricity)
WPD	Western Power Distribution
YE	Yorkshire Electricity



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## Summary

### Introduction

Mott MacDonald and British Power International have been retained by Ofgem to assist in the design of both standard templates for collecting data under the Information and Incentives Project (IIP) and a detailed framework for undertaking the audits of the measurement systems and reported IIP information. As part of the assignment and in accordance with the agreed framework, Mott MacDonald and British Power International, supported by ERA Technology also carried out an interim review of IIP information and measurement systems during September/October 2001. The results from this interim review are collected in this report.

The interim review achieved the following three main aims:

- to provide information to Ofgem and feed back to the distribution companies on the progress companies are making in implementing their measurement systems
- to comment on the companies' ability to meet the required levels of accuracy
- to gather lessons learnt and implications for the audit framework proposed in August 2001.

The interim review employed questionnaires to ensure that a consistent approach was followed by all the interim review teams. It was also decided to pilot the development of the approach with some of the distribution companies in order to ensure that maximum benefit was obtained from the visits and that the aims of the review were accomplished. The programme of visits covered eleven companies, according to the ownership structure of the industry at the time of the review. The summary of the results has been presented by licensee and the appendices cover companies by ownership structure. The visits were approached as a learning exercise and an opportunity for the companies to obtain feedback on progress. To ensure that the approach followed by the review team was robust and compliant with Ofgem's requirements, the whole process has been audited internally by a member of Mott MacDonald's staff.

### Summary of the results

#### Progress

All companies visited during the interim review have given IIP a high level of commitment and have deployed the necessary levels of resources to ensure that all key measurement systems for reporting incidents and short interruptions are in place by April 2002.

The interim review team found that all companies, except Scottish Power (SP) and Manweb (MW) will have measurements systems in place for reporting the speed of telephone response by direct measurement by April 2002. SP and MW are moving towards direct measurement and they hope to have this complete by the winter of 2002 with interim arrangements in place by April 2002.

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## **Adequacy of the Proposed Measurement Systems**

The review team considers that all companies visited are likely to meet the IIP required levels of accuracy if the systems they implement are as discussed with the team at the time of the reviews and if companies take care to avoid any errors originating from the weaknesses perceived in the systems by the review team.

All companies visited have developed a robust methodology to identify customers via MPANs that complies with the RIGs. In all cases, the one-off exercise to recognise existing customers as primary MPANs will result in a high level of accuracy (>95%). Some companies will rely more heavily than others on external supplier information to update their databases. Distribution companies need to ensure that their own procedures are sufficiently robust to recognise when supply companies are not timely in this regard.

All companies visited will have some form of connectivity model (or electronic representation of the distribution network) in place that will allow customer information to be associated (either automatically or manually) with the network down to the Low Voltage level. All companies are undergoing data cleansing exercises to verify the accuracy of this association and help ensure that they meet the required levels of accuracy for reporting. The audit team next year will need to understand more fully the impact of issues such as streets with several cables and incorrect service connections and the probabilistic nature of some of the network associations.

All companies have comprehensive documentation systems available to all members of staff that include information on IIP and the RIGs interpretations and requirements. These systems ensure that IIP information is fully available to personnel on a need basis.

All the companies visited have centralised HV control centres with high degrees of automation. Some companies also have centralised control centres for the control of their LV networks. In these cases, the role of field operators in providing accurate information is still important but central control provides a double checking mechanism and ensures that the information is consistent.

All companies except Scottish Power and Manweb, have implemented sophisticated and highly automated telephone systems that will allow raw IIP data to be generated. Further work needs to be undertaken to ensure that companies' systems produce data in accordance with the RIGs and the teams undertaking the full IIP audit in 2002 will need to understand in detail the nature of companies' telephone systems and how the systems have been programmed to produce IIP statistics. It is recommended that further work is undertaken prior to the full audit to gain a better understanding of how companies are measuring the speed of telephone response.

During the interim reviews the team was made aware of a process known as 'Call flushing'. The use of this facility would enable a company to artificially improve the statistics for its speed of telephone response. Whilst the team found no specific cases of call flushing being used, it was apparent that several of the companies' telephone systems are capable of having the call-flushing facility activated. It is likely that this area of the telephone system will be examined during the full IIP audits to ensure that no company is using a call-flushing facility.

All companies have demonstrated a committed approach to training and internal auditing. This will support IIP compliance greatly and will allow companies to track the need for changes.

The review team was also interested in identifying potential sources of error in the companies' measurement systems that may lead to deterioration of reporting if unchecked. It was found that most

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companies' reporting relies on manual inputting of information that was generated automatically. Although there are no intrinsic problems associated with manual processes, they require suitable levels of control to avoid deterioration in reporting over time.

Companies without centralised control centres for the LV network tend to rely heavily on regional offices for their reporting. In some instances, LV reporting may be less accurate due to a high dependence on field staff reports and there is potential for varying quality of reporting across regions.

All companies demonstrated a committed approach to internal auditing. Nevertheless, in some cases the personnel carrying out the audits were considered by the review team not to be independent enough to provide objective analysis. This limits the learning potential of the audits.

### **Interpretation of the RIGs**

During the interim review visits discussions were held with the companies regarding their interpretation of the definitions contained within the RIGs. Generally speaking, companies have interpreted the RIG definitions 'as written' and we found no obvious cases where companies have either mis-interpreted any particular definition or omitted it altogether. However, detailed discussions have found areas where further clarification by Ofgem would provide clarity and ensure that there is consistent interpretation across all companies. Ofgem has recently published a revised version of the RIGs for consultation with the companies.<sup>1</sup>

### **Learning Points from the Interim Review**

During the interim review, the team asked all companies visited about their willingness to share learning points with other companies.

Most companies suggested that they would consider sharing information with others, but this would depend on its relevance, and it would need to be determined on an individual basis. They were also concerned about sharing information that may be commercially sensitive.

### **Modifications to the Proposed Audit Framework**

As a result of considering the distribution companies' formal responses to the August 2001 proposals and the learning obtained during the interim review about companies measurement systems we recommend some modifications to the approach of the full IIP audit to be carried out next year (2002). The modified approach is still a three-stage process.

#### *Stage 1: Audit of the Measurement Systems*

This stage will involve understanding the accuracy of two of the key elements of the measurement systems, namely the methodology employed to identify customers via MPANs and the connectivity model. The accuracy of both elements will be combined to obtain the accuracy level of the two elements of the measurement systems. It is now recommended that it is not necessary to estimate the impact on accuracy of the interpretation of the RIGs, companies' procedures, training and internal

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<sup>1</sup> Ofgem "Revised Regulatory Instructions and Guidance" December 2001

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auditing in Stage 1 of the audit because the impact of any errors in this respect will be reflected in a quantifiable form in the accuracy of the reports. This will be assessed when auditing the sample of incidents in Stage 3. However, it will still be important to identify areas where companies are not reporting in line with the RIGs.

This modified approach abolishes the use of weightings and rankings for different elements of companies' measurement systems therefore eliminating the most subjective and potentially unclear aspect of the framework proposed in August 2001.

#### *Stage 2 - Statistical Analysis*

This stage is essentially the same as that proposed in August 2001 with data gathered from the companies being processed statistically to obtain an adequate sample to audit in Stage 3. The results from this stage will then become inputs for Stage 3.

#### *Stage 3 – Audit of Incident Reporting*

This stage will entail a visit to all companies to trace the reporting history of all the selected data. We will assess whether the information reports are in accordance with that which would be reported by the measurement systems and other relevant information.

At the end of this stage, the accuracy of the samples will be calculated (using a 95% confidence limit) and combined with the accuracy resulting from Stage 1 to find the final accuracy of reporting.

### **Pending issues**

There are a number of issues that need to be developed further to add more detail and clarity to the audit framework. (These are detailed in the main body of the report)

It is proposed that a pilot statistical analysis is carried out to explore most of these issues. These would be undertaken prior to initiating the first full audit.

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# 1 Introduction

## 1.1 Background

The Regulatory Instructions and Guidance (RIGs) document was published by Ofgem in February 2001 as part of the Information and Incentives Project (IIP) and in accordance with the IIP information licence condition.<sup>1</sup> The RIGs set out detailed definitions and guidance for the reporting requirements that the distribution companies will be expected to meet under the IIP. They also provide a framework for the collection and provision of accurate and consistent data across the distribution businesses.

The scope of the information sought includes the following:

- the number of interruptions to supply per year
- the duration of interruptions to supply per year
- the number of short interruptions to supply per year
- speed of telephone response.

Ofgem has specified minimum levels of accuracy for the information reported on interruptions of three minutes or longer. These are specified in Table 1-1. Distribution companies are required to meet both the overall and the Low Voltage (LV) minimum levels of accuracy to comply with the IIP licence condition.

**Table 1-1: Minimum Levels of Reporting Accuracy**

	<b>Minimum Level of Accuracy for LV System Interruptions (%)</b>	<b>Minimum Overall Level of Accuracy (%)</b>
Number of interruptions to supply	90	95
Duration of interruptions to supply	90	95

In addition, distribution businesses are requested to estimate the level of accuracy with which they report short interruptions to supply. These estimates will be reviewed by the auditors. The companies are expected to have the necessary measurement systems in place by April 2002 for the delivery of reporting to the required levels of accuracy.

Mott MacDonald and British Power International have been retained by Ofgem to assist in the design of both standard templates for collecting data under the IIP and a detailed framework for undertaking the audits of the measurement systems and reported IIP information. As part of the assignment and in accordance with the agreed framework, Mott MacDonald and British Power International, supported by ERA Technology also carried out an interim review of IIP information and measurement systems at distribution companies during September/October 2001. The results from this interim review are collected in this report.

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<sup>1</sup> Information and Incentives Project, Regulatory Instructions and Guidance, Ofgem, February 2001. A revised version of the RIGs was published in December 2001. Any implications raised by changes to the RIGs will need to be taken into account in designing the audit framework.

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## **1.2 Aims of the Interim Review**

The interim review carried out during September/October 2001 had three main aims:

- to provide information to Ofgem and feed back to the distribution companies on the progress companies are making in implementing their measurement systems
- to comment on the companies' ability to meet the required levels of accuracy
- to gather lessons learnt and propose modifications to the audit framework proposed in August 2001.

The review has achieved its aims and details of this are included in Section 2 where the results of the review are summarised.

## **1.3 Methodology of the Interim Review**

The approach followed for the interim review had the following key elements:

- questionnaires
- pilots
- visits to the distribution companies
- internal auditing

### **1.3.1 Questionnaires**

To ensure that a consistent approach was followed by all the interim review teams a set of questionnaires was developed. (A sample of these is included in Appendix L) The questionnaires were aimed at gathering enough information to provide the review team with in-depth knowledge of the systems and procedures the companies propose to follow to comply with IIP. Accordingly, they were structured to cover the following areas:

- the methodology employed by the companies to identify customers via MPANs
- the methodology and assumptions made in the connectivity model
- the management processes and data flows put in place for incident reporting
- details of the training programmes devised to support IIP reporting
- internal auditing of IIP measurement systems
- the companies' interpretation of the RIG definitions
- measurement systems and procedures for reporting short interruptions
- measurement systems and procedures to provide speed of telephone response information.

The questionnaires also asked for details on progress made on implementing the measurement systems by April 2002 in all the areas mentioned above.

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### 1.3.2 Pilots

It was decided by the team and agreed by Ofgem that the development of the approach to the interim review should be piloted with some of the distribution companies in order to ensure that maximum benefit was obtained from the visits and that the aims of the review were accomplished. Accordingly, three companies, London Power Networks, Western Power Distribution (covering South Wales Electricity and South Western Electricity) and Yorkshire Electricity Distribution were chosen. These companies helped the review team to refine the questionnaires and the approach to the review.

### 1.3.3 Visits

The interim review was approached as a learning exercise and an opportunity for the companies to obtain feedback on progress. It was considered that as four teams of two people each would undertake the visits, consistency of approach was of paramount importance to ensure to that all companies were treated the same way. A team training day was held to provide team members with project background and to introduce them to the customer. It was important to ensure that all members of the team were conversant with the aims of the visits, the procedures to follow and the reasoning behind the questionnaires. Feedback and early learning points arising out of the pilot visits were included in the discussions.

To provide further consistency between visits and to ensure that the team was adopting the correct approach, Ofgem observed some of the interim reviews. The programme of visits covered eleven companies, according to the ownership structure of the industry at the time of the review:

- Eastern Electricity (TXUED)
- East Midlands Electricity (EME)
- London Power Networks (LPN)
- Midlands Electricity (GPU)
- Northern Electric (NEDL)
- SEEBOARD Power Networks (SE)
- Scottish Power. This visit covered two licensees: Scottish Power (SP) and Manweb (MW)
- Scottish and Southern Energy (SSE). This visit covered two licensees: Southern Electricity (SEL) and Scottish Hydro (SH)
- United Utilities (UU)
- Western Power Distribution (WPD). This visit covered two licensees, South Wales Electricity (SWE) and South Western Electricity (SWEL)
- Yorkshire Electricity (YE)

As a consequence of the openness of the meetings and the amount of information provided to the review teams, the companies expressed the desire, and Ofgem agreed, to keep company specific information confidential where appropriate.

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### **1.3.4 Internal Auditing**

To ensure that the approach followed by the review team was robust and compliant with Ofgem's requirements, the whole process has been audited internally by a member of Mott MacDonald's staff with the necessary skills and who is not directly involved in the project. The comments of the auditor have been taken into account as necessary.

## **1.4 Structure of the Report**

The results of the interim review are summarised in this report as follows:

- section 2 first explains the key elements of the measurements systems that were investigated during the interim review. This is followed by non-confidential comments on the progress made by companies in implementing the proposed measurement systems. It also provides analysis on the adequacy of the systems proposed and the companies' interpretation of the RIGs
- section 3 contains lessons learnt from the interim review and proposes modifications to the audit framework proposed in August 2001
- the report contains eleven confidential company specific appendices. These describe and analyse in detail the measurement systems proposed by each of the companies visited. The respective appendix has been made available to each company.



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## **2 Summary of the Results**

This section presents the results from the interim review by licensee and accordingly it summarises the findings for 14 companies. The information contained in this summary is expanded in the company specific appendices at the end of this report. For Scottish Power and Manweb the raw information is included in their parent company's appendix, Scottish Power. The data relevant to South Wales Electricity and South Western Electricity is contained in Western Power Distribution's appendix and Southern Electricity and Scottish Hydro's information is located under the Scottish and Southern Energy appendix.

### **2.1 Key Elements of the Measurement Systems**

Measurement systems for reporting IIP information have a number of key elements. These include, for example, algorithms, data flows and management processes. These areas vary depending on the output measure and in particular between interruptions and speed of telephone response.

This section provides a brief description of the different elements that were investigated during the interim review for each output measure.

#### **2.1.1 Incidents and Short Interruptions**

The key elements of the measurement systems required for reporting incidents and short interruptions are the same and these are described below.

##### **(i) Customer Identification via Metering Point Administration Numbers (MPANs)**

The review team discussed with all the distribution companies their methodology for identifying individual customers at each connection point using MPANs. The team explored any assumptions or extrapolations made, the treatment given to multiple and primary MPANs and any exclusions made from the count. It also gained an understanding of how customers in multi-occupancy buildings have been accounted for.

##### **(ii) The Connectivity Model**

This is the process employed by each company to identify the points on the distribution network at which customer connections are made. The review team investigated the following:

- the approach itself and the impact of any assumptions or extrapolations made
- the mechanism for reconciling customer numbers identified from MPANs with the number of customers identified in the connectivity model
- the extent to which the connectivity model captures network information such as the location of lines and equipment and their normal feeding arrangements
- the procedures for updating the model to reflect new connections and temporary and permanent changes to the network
- the process by which connectivity is applied at different voltage levels

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### **(iii) Compliance with the RIGs**

The data generated by the companies' measurement systems (including data originating from contractors) and collected in the standard Ofgem template needs to reflect the definitions and instructions embodied in the RIGs. The review team checked the companies' interpretation of the RIGs to examine any inconsistencies.

### **(iv) Reporting Procedures**

This refers to the procedures followed within the companies for recording IIP data for incidents and short interruptions and it entailed checking issues such as:

- the means by which incidents and short interruptions are captured at different voltage levels, i.e., automatically, via customer calls or through a field operator
- whether incident data is recorded manually or automatically at different voltage levels
- the documents that are used and procedures that are followed
- information and data flows within the company to support IIP reporting
- the potential source of errors made in any of the processes described above.

### **(v) Training**

The review team examined any training programmes already in place or to be implemented within companies and their agents to support the IIP reporting schemes.

### **(vi) Internal Audits**

The review team examined whether companies undertake internal audits of their measurement systems and associated procedures and whether learning and improvements take place as a result of these audits.

## **2.1.2 Speed of Telephone Response**

The areas of the measurement systems and procedures for reporting speed of telephone response that were investigated during the interim review are described below.

### **(i) Telephone System**

The review team examined the way calls, including calls from mobile telephones, are received and logged within companies and it explored the type of answering services provided to the customers, the technology employed and whether agents and contractors are used. It also examined whether the companies employ direct measurement to calculate the average speed of telephone response or whether they use sampling or interpolation.

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## **(ii) Compliance with the RIGs**

The data generated by the companies' telephone systems and collected in the standard Ofgem template needs to reflect the definitions and instructions embodied in the RIGs. The review team checked companies' interpretations of the RIGs to examine for any inconsistencies. This included checking the companies' interpretation of concepts such as 'specified contact lines', 'calls abandoned' and 'all lines busy'. The review did not assess how the telephony systems of each company were programmed to reflect the definitions when gathering the statistics.

## **(iii) Reporting Procedures**

This refers to the procedures followed within the companies for recording speed of telephone response data and it entailed checking issues such as whether data is recorded manually or automatically, the documents and procedures that are followed, the information and data flows within the company to support IIP reporting and the potential source of errors made in any of the processes followed.

Also, the review team examined any procedures and instructions implemented within the companies' agents or contractors to support the application of the RIGs' definitions.

## **(iv) Training**

This examined any training imparted within the companies, their agents and/or contractors to support the IIP reporting scheme with particular reference to speed of telephone response.

## **(v) Internal Audits**

This examined whether companies undertake internal audits of their telephone systems and associated procedures and whether learning and improvements are introduced as a result of these audits.

## **2.2 Progress**

### **2.2.1 Reporting Incidents and Short Interruptions**

All companies visited during the interim review have given IIP a high level of commitment. From the information gained during the interim reviews, it also appears that they have deployed the necessary levels of resources to ensure that all key measurement systems for reporting incidents and short interruptions are in place by April 2002.

Table 2-1 shows the timeline for implementation of all the elements of the measurement systems explored during the interim review. The table covers progress for systems and associated procedures for reporting both incidents and short interruptions as they have common key elements. During the interim review both output measures were considered separately and when different timelines are relevant these are highlighted in the text.

Table 2-1 shows that most companies have already put in place IIP supporting procedures, training and auditing programmes. LPN, SWE, SWEL and YE were due to have completed the data cleansing of their MPANs and will have completed their connectivity model by the end of 2001. NEDL, SE, SP

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and MW are a little further behind the other companies but all the key elements of their measurement systems will be deployed by April 2002. NEDL suggested that the connectivity model would achieve the required accuracy by December 2001 but further developments would take place until March 2002. Accordingly, Table 2-1 shows two entries for NEDL under the connectivity model.

**Table 2-1 : Progress Made on Implementing Measurement Systems for Reporting Incidents and Short Interruptions**

	<i>EME</i>	<i>GPU</i>	<i>LPN</i>	<i>NEDL</i>	<i>MW</i>	<i>SE</i>	<i>SEL</i>	<i>SH</i>	<i>SP</i>	<i>SWE</i>	<i>SWEL</i>	<i>TXUED</i>	<i>UU</i>	<i>YE</i>
<b><i>MPANs</i></b>														
Sep-01	✓	✓		✓	✓		✓	✓	✓					
Dec-01			✓	✓		✓				✓	✓	✓	✓	✓
Feb-02														
<b><i>Connectivity</i></b>														
Sep-01	✓	✓												
Dec-01			✓	✓						✓	✓	✓	✓	✓
Jan-02							✓	✓						
Mar-02				✓	✓	✓			✓					
<b><i>Processes, RIGs</i></b>														
Sep-01	✓		✓			✓	✓	✓				✓		✓
Nov-01													✓	
Dec-01		✓								✓	✓			
Feb-02				✓										
Mar-02					✓				✓					
<b><i>Training</i></b>														
Sep-01	✓		✓				✓	✓		✓	✓	✓		
Dec-01		✓		✓	✓				✓				✓	✓
Mar-01						✓								
<b><i>Auditing</i></b>														
Sep-01	✓		✓		✓		✓	✓	✓			✓	✓	✓
Oct-01										✓	✓			
Dec-01		✓		✓										
Feb-02						✓								

**EME:** East Midlands Electricity Distribution, **GPU:** Midlands Electricity, **LPN:** London Power Networks, **MW:** Manweb, **NEDL:** Northern Electric Distribution Ltd, **SE:** Seeboard, **SEL:** Southern Electricity, **SH:** Scottish Hydro, **SP:** Scottish Power, **SWE:** South Wales Electricity, **SWEL:** South Western Electricity, **TXUED:** Eastern Electricity, **UU:** Norweb, **YE:** Yorkshire Electricity

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## **2.2.2 Speed of Telephone Response**

The interim review team found that all companies, except SP, MW, UU and YE have already implemented the key elements of the measurements systems for reporting the speed of telephone response. However, the majority of the companies are not yet using IIP compliant reporting systems for the initial data that has been sent to Ofgem. The interim review explored companies' understanding of the RIGs' definitions but it do not analyse how such understanding was reflected in the programming of the telephone systems to produce the relevant statistics. It is recommended that further work is undertaken ahead of the full audit to gain a better understanding of the way in which companies are measuring the speed of telephone response and the configuration of telephony systems.

At the time of the interim review SP and MW did not have a telephone system capable of direct measurement. The companies are moving towards direct measurement and they hope to have this complete by the winter of 2002. In the meantime, the parent company has already held discussions with Ofgem regarding the adequacy of its proposed interpolation methods. The interim arrangements will be in place by April 2002.

UU and YE already have sophisticated automatic telephone systems but in the case of UU, the company is still developing IIP procedures and both companies are still elaborating training programmes to comply with IIP. These will be fully in place by December 2001.

Some companies, in particular LPN, TXUED, SWE and SWEL already have compliant systems in place but they are developing new more automated systems. In all these cases, the new improved systems will be implemented by April 2002.

## **2.3 Adequacy of the Proposed Measurement Systems**

### **2.3.1 Characteristics of the Proposed Systems**

#### **(i) Incidents and Short Interruptions**

As in Section 2.1.1, this section covers systems and associated procedures for reporting both incidents and short interruptions as they have common key elements. Any differences are highlighted in the text.

Table 2-2 summarises the characteristics of the key elements of the measurement systems that the companies propose will be in place by April 2002. From the table it can be seen that all companies visited will have in place an MPAN methodology that will be compliant with the RIGs.

All companies, will have some form of network connectivity down to LV level with two main types of connectivity models being implemented across the industry; one relying on customer records and geographical information and another that links customers to the network via a probabilistic algorithm. All companies, with the exception of SP and MW, have established procedures to update their HV/EHV models to reflect temporary and permanent changes in the network at all high voltage levels. Many are leaving their LV models in the normal operational state unless permanent or long-term changes are made to the running conditions as provided for under the RIGs. At the time of the interim

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review, SP and MW were still developing such procedures for the LV part of the network to take account of these temporary changes.

During the interim review, discussions were held to assess the companies' interpretation of the RIGs. More details on this issue are included in Section 2.4 below.

Companies will employ either the National Fault and Interruptions Reporting Scheme (NaFIRS), or a company specific variation of NaFIRS to gather IIP data. There are a variety of processes for reporting incidents and short interruptions in place across the industry with varying degrees of automation and centralisation.

All companies demonstrated a committed approach to training with general briefings being supplemented with targeted training for key staff members and for key subjects. Also, all companies except SH and SEL keep up to date training records that auditably demonstrate that IIP training has been delivered.

All companies visited have designed internal auditing programmes for IIP data. In most companies, audits will be carried out by company departments not involved in generating IIP data and therefore obtain 'arms length' auditing. LPN and TXUED will also carry out second party audits on IIP data. GPU and those companies with ISO accreditation of their processes will also have external audits in accordance with their ISO certification processes. The review team found that in four licensee companies, MW, SP, SH and SEL, the proposed auditors were not independent enough to be able to provide an objective analysis. It appeared that NEDL could also fall into this category unless it firmed-up its approach.

**Table 2-2 : Proposed Systems for Reporting Incidents and Short Interruptions**

	<i>Companies Proposed Systems</i>													
	<i>EME</i>	<i>GPU</i>	<i>LPN</i>	<i>NEDL</i>	<i>MW</i>	<i>SE</i>	<i>SEL</i>	<i>SH</i>	<i>SP</i>	<i>SWE</i>	<i>SWEL</i>	<i>TXUED</i>	<i>UU</i>	<i>YE</i>
<b>MPAN Methodology</b> RIG compliant	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
<b>Connectivity model</b> down to LV	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		✓
algorithm based			✓	✓		✓	✓	✓	✓	✓	✓	✓		✓
based on geographical and postal addresses	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		✓
procedures to update for permanent and temporary changes at all voltages	✓	✓	✓	✓		✓	✓	✓	✓	✓	✓	✓		✓
procedures to update for permanent and temporary changes to the network at HV and higher voltages					✓				✓					✓
no robust procedures to update for permanent and temporary changes at LV					✓				✓					✓
no connectivity model													✓	
procedures to update customer numbers	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		✓
<b>RIGs</b> correct interpretation of the RIGs		✓	✓		✓				✓				✓	
need for some clarifications	✓			✓		✓	✓	✓		✓	✓	✓		✓
<b>Procedures</b> NaFIRS based reporting	✓			✓		✓	✓	✓		✓	✓		✓	✓
company specific variation of NaFIRS		✓	✓	✓	✓				✓			✓		✓
initial event capture at HV and higher voltages														
automatic	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
manual														
initial event capture at LV														
automatic	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
manual														
details of incident history at HV and higher voltages														
automatic				✓				✓						
manual centralised	✓	✓	✓		✓	✓	✓		✓	✓	✓	✓	✓	✓
manual decentralised														
details of incident history at LV														
manual centralised	✓	✓	✓		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
manual decentralised														
elaboration of reports at HV and higher voltages														
electronic		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
PC-NaFIRS	✓					✓	✓	✓	✓	✓	✓	✓	✓	✓
elaboration of reports at LV														
electronic		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
PC-NaFIRS	✓					✓	✓	✓	✓	✓	✓	✓	✓	✓
customer numbers														
automatic from connectivity model at all voltages	✓	✓	✓	✓		✓	✓	✓	✓	✓	✓	✓		✓
automatic from connectivity model at HV and higher voltages					✓		✓	✓	✓	✓	✓	✓		✓
sampling													✓	



**Table 2-3 : Proposed Systems for Reporting Incidents and Short Interruptions (continued)**

	<i>Companies Proposed Systems</i>													
	<i>EME</i>	<i>GPU</i>	<i>LPN</i>	<i>NEDL</i>	<i>MW</i>	<i>SE</i>	<i>SEL</i>	<i>SH</i>	<i>SP</i>	<i>SWE</i>	<i>SWEL</i>	<i>TXUED</i>	<i>UU</i>	<i>YE</i>
<b><i>IIP Training</i></b>														
general	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
targeted	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
records kept	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
no records kept							✓	✓						
competence based	✓													✓
<b><i>Internal Auditing</i></b>														
compliant with BS or ISO standards	✓	✓				✓								
second party auditing			✓									✓		
arms length auditing	✓									✓	✓		✓	✓
audit team not distanced enough from audits or with insufficient authority to achieve compliance				✓	✓		✓	✓	✓					

**Key:**

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**SEL:** Southern Electricity, **SH:** Scottish Hydro, **SP:** Scottish Power, **SWE:** South Wales Electricity, **SWEL:** South Western Electricity, **TXUED:** Eastern Electricity, **UU:** Norweb, **YE:** Yorkshire Electricity

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## **(ii) Speed of Telephone Response**

Table 2-3 summarises the key characteristics of the measurements systems proposed by the companies for the reporting speed of telephone response.

From the table it can be seen that all companies, except two licensees MW and SP, have a fully automated telephone system that will be programmed to produce IIP statistics by direct measurement. At the time of the review, MW and SP's parent company was undergoing discussion with Ofgem about its proposed methodologies for interpolation. SP and MW will produce Ofgem's statistics partly by direct measurement and partly by interpolation.

Most companies use either the BT or the Cable and Wireless (C&W) exchange to answer their main 0800 no supply number with a voice-processor message that can be changed to provide for fault / service restoration information and updates. Most companies also use their telephone service provider's line expansion capability to cover major incidents, such as storms, when high call volumes are experienced. Some companies also contract outside agents to respond to all calls. Some companies handle 'normal' call volumes themselves and contract-out 'peaks' to agencies at times of high call volumes, such as storms.

As with incidents and short interruptions, during the interim review discussions were held to assess the companies' interpretation of the RIGs regarding speed of telephone response. (More details on this issue are included in Section 2.4 below). The interim review explored companies' understanding of the RIGs' definitions but it do not analyse how such understanding was reflected in the programming of the telephone systems to produce the relevant statistics.

All companies visited capture phone calls from mobile telephones and in some cases, plans are in place to develop a system that is able to recognise the area where the calls come from so fault messaging can be applied. IIP information will generally be produced automatically as a result of programming the telephone system to generate the required statistics. In some companies, this will be supplemented by some manual processes to input information to produce the final reports to Ofgem. In the case of SP and MW and as already discussed, some of the statistics will be generated manually.

The need to provide statistics that are compliant with the RIGs was discussed with all companies but no detailed evidence was shown, with the exception of GPU, SWE, SWEL and YE, of how the necessary calculations will be carried out. The teams undertaking the full IIP audit in 2002 will need to understand in detail the nature of the companies' telephone systems and the way in which the companies have programmed their systems to calculate the speed of telephone response and incorporated the associated requirements from the RIGs. The auditors will also need to be assured that the resultant figures are an accurate reflection of the actual situation and that the companies have correctly populated the Ofgem standard template.

As already mentioned, most companies make use of external telephone service providers to either respond through voice-processor messages, that the distribution companies can change, or to route freephone calls to the distribution company. Many also use contractors as agents. In some occasions it was not clear to the review team that robust procedures will be in place to ensure that the contractors provide the right IIP information to the company in question.

As with incidents and short interruptions, all companies demonstrated a committed approach to training to support IIP for reporting the speed of telephone response. Most companies that make

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significant use of contractors as agents also ensure that such personnel are trained to cover IIP issues to the same standard as in-house people.

The same issues discussed in Section 2.1.1 (i) regarding internal audits of IIP data for incidents and short interruptions are applicable for speed of telephone response. Also, some companies that employ contractors do not propose to audit the information generated externally. In these cases, compliance with IIP will not be fully within the distribution company's control and the companies in question may be exposed to inaccurate reporting.

**Table 2-4 : Proposed Systems for Reporting Speed of Telephone Response**

	<b>Companies Proposed Systems</b>													
	<i>EME</i>	<i>GPU</i>	<i>LPN</i>	<i>NEDL</i>	<i>MW</i>	<i>SE</i>	<i>SEL</i>	<i>SH</i>	<i>SP</i>	<i>SWE</i>	<i>SWEL</i>	<i>TXUED</i>	<i>UU</i>	<i>YE</i>
<b>Telephone System</b>														
fully automated	✓	✓	✓	✓		✓	✓	✓		✓	✓	✓	✓	✓
partly automated		✓	✓	✓	✓	✓	✓		✓	✓	✓	✓	✓	✓
use of IVR		✓	✓	✓	✓	✓	✓		✓	✓	✓	✓	✓	✓
direct measurement	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
measurements by interpolation					✓		✓		✓	✓	✓	✓	✓	✓
use of BT/C&W exchange as the service provider	✓	✓	✓	✓				✓		✓	✓	✓	✓	✓
significant use of contractors as agents			✓	✓	✓			✓	✓	✓	✓	✓	✓	✓
<b>RIGs</b>														
correct understanding of the RIGs' definitions	✓	✓		✓	✓	✓	✓	✓	✓	✓	✓		✓	✓
need for some clarifications in the RIGs' definitions		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
need to explore statistics to assess whether they conform with RIGs	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
<b>Procedures</b>														
capture of calls from mobile telephones	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
automatic reports	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
manual input to reports			✓	✓	✓				✓	✓	✓	✓	✓	✓
procedures implemented within contractors to support IIP			✓	✓	✓				✓	✓	✓	✓	✓	✓
detailed evidence provided of statistical calculations		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
no evidence provided of how statistics are calculated	✓		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
<b>IIP Training</b>														
general	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
targeted	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
records kept	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
no records kept							✓	✓					✓	✓
competence based	✓													✓
training for contractors			✓							✓	✓	✓		
<b>Internal Auditing</b>														
compliant with BS or ISO standards	✓	✓				✓								
second party auditing			✓									✓		
arms length auditing	✓									✓	✓		✓	✓
audit team not distanced enough from audits				✓	✓		✓	✓	✓	✓	✓			
audit of information from contractors		✓	✓					✓	✓	✓	✓			
no procedures to audit information from contractors	✓			✓								✓		

**Key:**

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### **2.3.2 Adequacy of the Proposed Systems**

The measurement systems and associated procedures proposed by the companies have a number of strengths and weaknesses. The review team considers that all companies visited are likely to meet the IIP required levels of accuracy if the systems they implement are as discussed with the team at the time of the reviews and if companies take care to avoid any errors originating from the weaknesses perceived in the systems by the review team.

The strengths and weaknesses of the measurement systems are explained in general terms below. (More detailed information is provided in the company specific appendices).

#### **(i) Strengths**

All companies visited have developed a robust methodology to identify customers via MPANs that complies with the RIGs, avoids double counting multiple MPANs and only excludes from the count unmetered supplies as these are not considered customers according to the RIGs. In all cases, the one-off exercise to recognise existing customers as primary MPANs will result in a high level of accuracy (>95%). Companies have procedures to then update customer counts. Due to the nature of the Metering Point Administration System (MPAS), all distribution companies have to rely upon supply companies for accurate information to enable them to update core MPANs to primary traded MPANs and hence recognise new customers in a timely way. Some companies will rely more heavily than others on external supplier information to carry out the updates. Distribution companies need to ensure that their own procedures are sufficiently robust to recognise when supply companies are not timely in this regard.

All companies will have in place some form of connectivity model, which associates customer information to the network down to LV. All companies are undergoing data cleansing exercises to ensure accuracy is within the required levels. The audit team next year will need to understand more fully the impact of issues such as streets with several cables and incorrect service connections and the probabilistic nature of some of the network associations.

All companies have comprehensive documentation systems available to all members of staff that include information on IIP and the RIGs interpretations and requirements. These systems ensure that IIP information is fully available to personnel on a need basis.

All the companies visited have centralised HV control centres with high degrees of automation. This means that much of the incident and short interruptions data is automatically captured in SCADA and therefore in an accurate manner. All the companies also have non-SCADA-equipped switchgear that requires manual operation. In all these cases, robust control procedures are in place to ensure that the information is accurately registered.

Some companies also have centralised control centres for the control of their LV networks. In these cases, the role of field operators in providing accurate information is still important but central control provides a double-checking mechanism and ensures that the information is consistent.

All companies except SP and MW, have implemented sophisticated and highly automated telephone systems that will allow raw IIP data to be generated accurately and Ofgem's statistics to be produced automatically. As already mentioned, it is likely that the teams undertaking the full IIP audit in 2002 will need to understand how the systems have been programmed to produce IIP statistics.

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All companies have demonstrated a committed approach to training and internal auditing. This will support IIP compliance greatly and will allow companies to track the need for changes.

## **(ii) Weaknesses**

The review team was interested in identifying potential sources of error in the companies' measurement systems that may lead to deterioration of reporting if unchecked.

It was found that most companies' reporting relies on manual inputting of information that was generated automatically. Although there are no intrinsic problems associated with manual processes, they require suitable levels of control to avoid deterioration in reporting over time.

Companies without centralised control centres for the LV network tend to rely heavily on regional offices for their reporting. In some instances, regions generate reports using centralised computer systems. In other cases, field reports are paper-based and taken to a central office for interpretation. In such occasions, LV reporting may be less accurate due to a high dependence on field staff reports and there is potential for varying quality of reporting across regions. Companies need to retain tight controls to avoid deterioration of reporting.

During the interim reviews the team was made aware of a process known as 'Call flushing'. Our understanding of this is that automatic telephone systems can be programmed to limit the size of queue of calls awaiting to be answered by an agent. Once the queue has reached a pre-determined length, subsequent calls are 'flushed' out of the system without trace.

The use of this facility would enable a company to artificially improve the statistics for its speed of telephone response. Whilst the team found no specific cases of call flushing being used, it was apparent that several of the companies' telephone systems are capable of having the call-flushing facility activated. It is likely that this area of the telephone system will be examined during the full IIP audits to ensure that no company is using a call-flushing facility.

As already mentioned, not all companies have in place robust internal auditing.

## **2.4 Interpretation of the RIGs**

During the interim review visits discussions were held with the companies regarding their interpretation of the definitions contained within the RIGs.

Generally speaking, companies have interpreted the RIG definitions 'as written' and we found no obvious cases where companies have either mis-interpreted any particular definition or omitted it altogether.

However, detailed discussions have found areas where further clarification by Ofgem would provide clarity and ensure that there is consistent interpretation across all companies. Companies also expressed their concerns that the MM/BPI template circulated in August 2001 had inconsistencies in comparison to the companies' understanding of the RIGs. Ofgem has published a draft version of revised RIGs for consultation which should address these issues and a revised template for collecting IIP information will also be made available to companies in the near future.

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## **3 Lessons Learnt**

### **3.1 Learning Points from the Interim Review**

During the interim review, the team asked all companies visited about their willingness to share learning points with other companies.

Most companies suggested that they would consider sharing information with others, but this would depend on its relevance, and it would need to be determined on an individual basis. They were also concerned about sharing information that may be commercially sensitive.

The following is a summary of the key points mentioned during the interim review:

- a preliminary internal audit should be carried out to assess the company's weaknesses and strengths
- the internal audit representative should attend IIP team meetings to offer an independent audit perspective on control requirements
- the programme of internal audit assignments should include agreement on action plans for improvement as appropriate
- internal audits should be followed-up to provide assurance that learning points have been translated into actions and that processes have been correspondingly improved
- regular formal internal audits should be carried out once the systems are in place to ensure continuous improvement
- internal audits need to be undertaken by personnel that are independent from the information and processes being audited and with enough authority to achieve compliance.

### **3.2 Modifications to the Proposed Audit Framework**

#### **3.2.1 Audit Framework Proposed in August 2001**

The framework proposed in August 2001 was envisaged as a three-stage process as exemplified in Figure 3-1 and described below.

##### **(i) Stage 1 - Audit of the Measurement Systems**

It was proposed that information would be sought from the companies prior to the audit visits and during the audit to understand the accuracy of their measurement systems. The outcome of this stage was to be an estimated level of accuracy of the measurement systems for each output measure. This assessment involved assigning rankings and weightings to all the key elements of the measurement systems, as discussed in section 2.1. The rankings aimed to reflect the relative significance of each element to the overall accuracy level and the weighting factors were designed to reflect the company specific nature of the measurement systems. Both rankings and weightings were consulted with companies during the interim review.

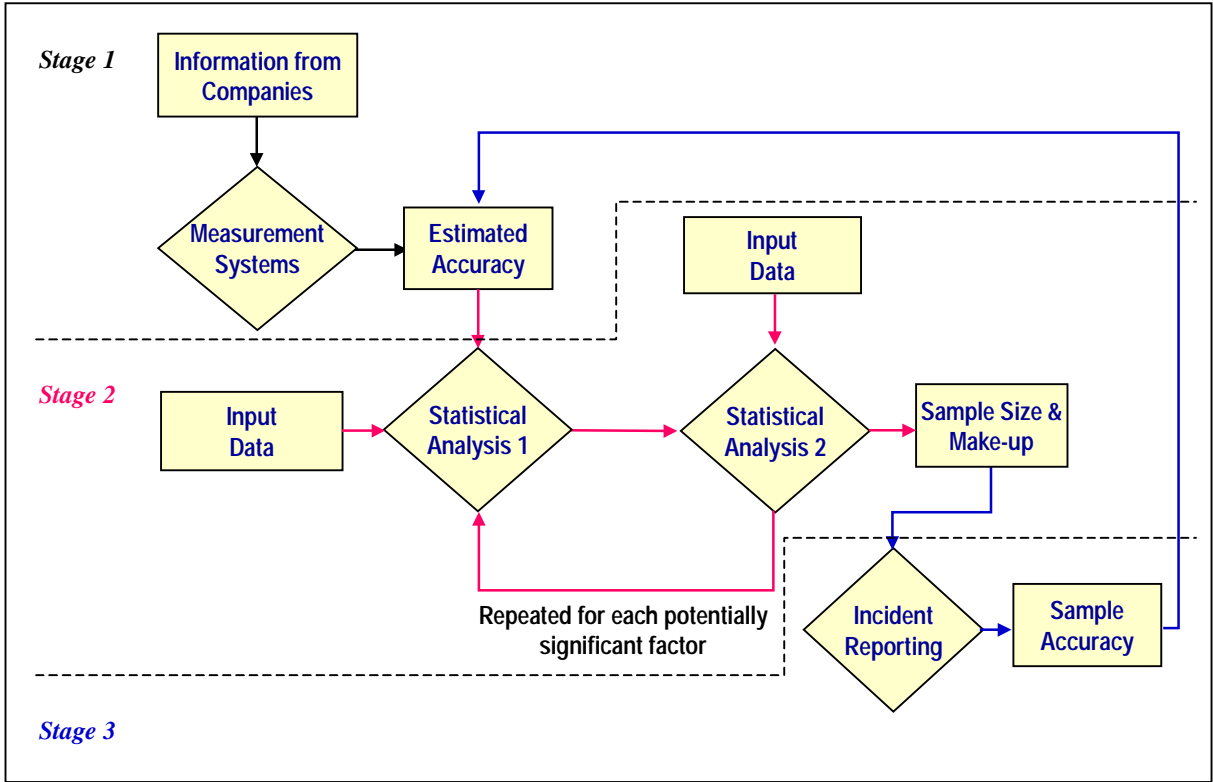
**(ii) Stage 2 - Statistical Analysis**

The August 2001 proposals suggested that the estimated level of accuracy found in Stage 1 together with data gathered from the companies were to be processed statistically to obtain the sample size. A number of distributions were to be tested to determine the distribution that best fitted the data. It was proposed that this analysis was to be carried out for each company and each data set. It was envisaged that different numbers of incidents may be audited in different companies as the size of the sample is driven by the measurement systems of each company and these are likely to vary. Once the size of the samples had been set, further analysis of the input data would be undertaken to stratify the sample. This is necessary to ensure that the sample chosen for each company is representative and takes into consideration factors outside the company’s control that may have a significant impact on the accuracy of incident data and reporting. The results from this stage would then become inputs for Stage 3.

**(iii) Stage 3 – Audit of Incident Reporting**

This embodied the information sampling audit where company visits would be carried out and reports checked. At the end of this stage, the accuracy of the samples would be calculated and compared to the estimated accuracy resulting from Stage 1. If these values differed significantly, the process would be reassessed.

**Figure 3-1 : Audit Framework Proposed in August 2001**



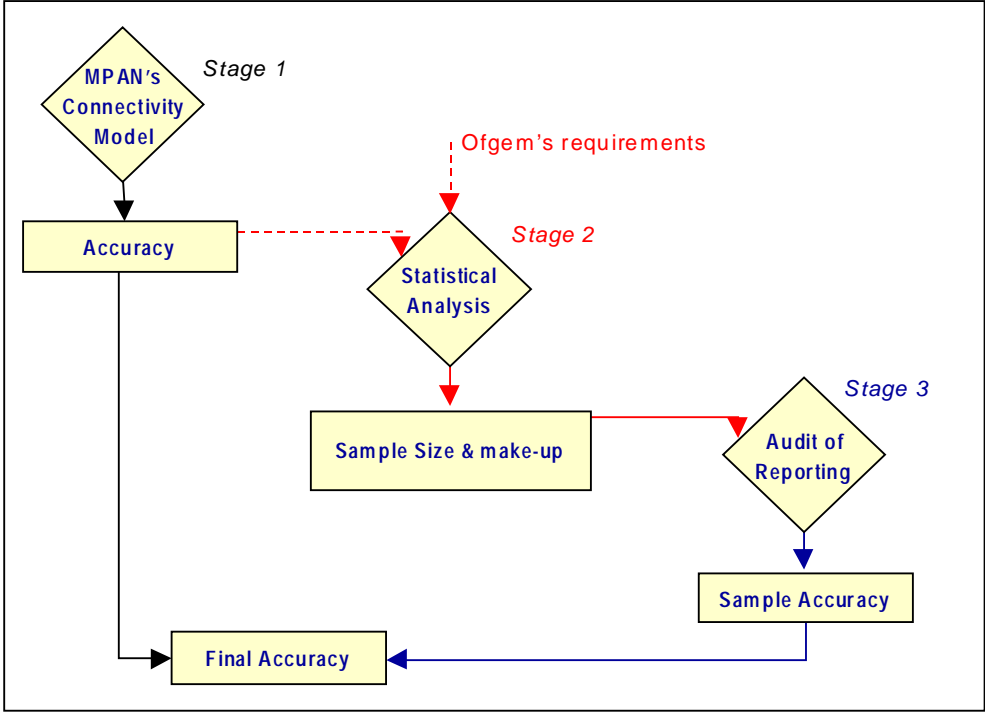
**3.2.2 Modified Audit Framework**

As a result of considering the distribution companies’ formal responses to the August 2001 proposals and the learning obtained during the interim review about companies measurement systems we would



like to modify the approach of the full IIP audit to be carried out next year (2002). The modified approach is summarised in Figure 3-2.

**Figure 3-2 : Modified Audit Framework**



The revised audit framework is still a three stage process.

**(i) Stage 1: Audit of the Measurement Systems**

This stage will involve gathering information from companies prior to the audit visits and during the audit to understand the accuracy of two of the key elements of their measurement systems, namely the methodology employed to identify customers via MPANs and the connectivity model. This will concentrate on analysing the impact of assumptions made and potential sources of error to determine accuracy to a 95% confidence limit. The connectivity model will also be studied by checking customer allocations on the network on a sample basis. Further discussions are needed to establish the means by which models based on algorithms will be assessed.

The accuracy of both elements will be combined to obtain the accuracy level of the these two elements of the measurement systems.

The audit framework proposed in August 2001 suggested assessing the impact on accuracy of all the elements of the measurement systems. These included as well as the MPAN methodology and the connectivity model, the interpretation of the RIGs, companies’ procedures, training and internal auditing. It is now understood that it is not necessary to estimate the accuracy of these elements in Stage 1 of the audit because their impact will be reflected in a quantifiable form in the accuracy of the reports. This will be assessed when auditing the sample of incidents in Stage 3.

This modified approach also abolishes the use of weightings and rankings therefore eliminating the most subjective and potentially unclear aspect of the framework proposed in August 2001.

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## **(ii) Stage 2 : Statistical Analysis**

This stage is essentially the same as that proposed in August 2001 with data gathered from the companies being processed statistically to obtain an adequate sample to audit in Stage 3.

The use of statistics to determine sample size is based on a knowledge of which mathematical relationship, or distribution, best describes the population of events being measured. Many populations are described by a normal distribution, which is characterised by 2 parameters: the mean and the standard deviation. The best distribution for this exercise is however not known; this is the first thing that needs to be established. Sample size can then be determined knowing the type of distribution, the desired level of accuracy and the desired confidence limits using statistical tables or iterative techniques.

Once the best distribution has been established, standard statistical techniques will then be used to determine the sample size for each data set using a 95% confidence limit and either the accuracy level found in Stage 1 or Ofgem's accuracy requirements (90% for LV and 95% for the overall voltage level) (more details on this are included in Section 3.2.3).

Once the size of the samples has been set, further analysis of the input data will be undertaken to stratify the sample. As mentioned in Section 3.2.1, this is necessary to ensure that the sample chosen for each company is representative and takes into consideration factors outside the company's control that may have a significant impact on the accuracy of reporting. Factors that are proven to be significant will be taken into account when selecting the incidents to sample.

The results from this stage will then become inputs for Stage 3.

## **(iii) Stage 3 : Audit of Incident Reporting**

This stage will entail a visit to all companies to trace the reporting history of all the selected data. We will assess whether the information reports are in accordance with that which would be reported by the measurement systems and other relevant information and we will check issues such as:

- the number of customers affected by each incident and relate them to the numbers that the measurements systems identify
- whether each incident has been captured by the measurement systems by contrasting customer and incident reports and by analysing that logged network events relate to the relevant incident reports
- the way time, restoration stages, new incidents and re-interruptions are logged, and comparison with the RIGs' definitions.

At the end of this stage, the accuracy of the samples will be calculated using a 95% confidence limit and combined with the accuracy resulting from Stage 1 to find the final accuracy of reporting.

### **3.2.3 Pending issues**

There are a number of issues that need to be developed further to add more detail and clarity to the audit framework. These include the following:

- the most appropriate distribution for IIP data

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- an indication of the sample size that will be required to undertake incident sampling (Stage 3 of the proposed audit framework)
  - an indication of any factors that will need to be taken into account to stratify the samples
  - the implications of the statistical analysis on input data requirements
  - details on the audit trail required for the full audits
  - the way to assess connectivity models based solely on algorithms

It is proposed that a pilot statistical analysis and a pilot Stage 3 audit are carried out to explore most of these issues. These would be undertaken in the new year and prior to initiating the first full audit. We would also like the opportunity to present the results of the piloting work to the industry to establish confidence in the application of the framework.

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**Appendix A Eastern Electricity (TXUED)**

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**Appendix B East Midlands Electricity Distribution (EME)**

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**Appendix C London Power Networks (LPN)**

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**Appendix D Midlands Electricity (GPU)**

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**Appendix E Northern Electricity (NEDL)**



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**Appendix F SEEBOARD Power Networks (SE)**

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**Appendix G Scottish and Southern Energy (SSE)**

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**Appendix H Scottish Power (SP)**

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**Appendix I United Utilities (UU)**

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**Appendix J Western Power Distribution (WPD)**

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**Appendix K Yorkshire Electricity (YE)**

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