Consultation on DS3 System Services Protocol Document

14th December 2018

EIRGRID SONI

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EXECUTIVE SUMMARY

The purpose of this paper is to provide an opportunity for stakeholders to provide feedback on the proposals to amend the DS3 System Services Protocol document – Regulated Arrangements, Version 1.0, published 12th December 2017.

This paper should be read in conjunction with the accompanying redlined Protocol document. The Protocol document specifies the Compliance Requirements which a service provider must satisfy before qualifying for remuneration for DS3 System Services in respect of its Providing Unit(s), as well as the Performance Monitoring procedures to be applied and the unit(s)' Operational Requirements. The document forms part of the DS3 System Services contractual arrangements.

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1. INTRODUCTION

1.1. EirGrid and SONI

EirGrid and SONI are the Transmission System Operators (TSOs) in Ireland and Northern Ireland. It is our job to manage the electricity supply and the flow of power from generators to consumers.

We have a responsibility to enable increased levels of renewable sources to generate on the power system while continuing to ensure that the system operates securely and efficiently. Our Delivering a Secure Sustainable Electricity System (DS3) programme seeks to address the challenges of increasing the allowable System Non-Synchronous Penetration (SNSP) up to 75% by 2020.

The results of the programme are now beginning to deliver benefits to the consumer. In recent months the maximum SNSP level allowable has increased to 65%. It is expected that similar trials will be conducted in the coming years with a view to achieving the DS3 programme's overall goal of a 75% SNSP limit.

A key component of the DS3 programme is the System Services work stream. Its aim is to put in place the correct structure, level and type of services in order to ensure that the system can operate securely with these higher levels of non-synchronous generation.

1.2. Overview of System Services

EirGrid and SONI have licencing and statutory obligations to procure sufficient system services to enable efficient, reliable and secure power system operation. The contractual arrangements and payment rates in Ireland and Northern Ireland were harmonised following the introduction of the SEM, with seven system services (POR, SOR, TOR1, TOR2, SSRP, RRS, and RRD) procured under the Harmonised Ancillary Services (HAS) arrangements.

New system services are required to support a move to higher levels of nonsynchronous generation. Four new services (SIR, RM1, RM3, and RM8) were introduced from 1 October 2016 following the commencement of the new DS3 System Services arrangements. The latter four services, together with the former seven services are referred to herein as the '11 existing services'. The FFR service was introduced from 1 October 2018 and a further two services (DRR and FPFAPR), are in the process of being introduced as they are required only at SNSP levels above

70%. All services are required to maintain the resilience of the power system as the SNSP levels increase. Table 1 provides a high-level summary of the DS3 System Services.

Table 1: Summary of DS3 System Services[1]

Service Name	Abbreviation	Unit of Payment	Short Description
Synchronous Inertial Response	SIR	MWs^2h	(Stored kinetic energy)*(SIR Factor – 15)
Fast Frequency Response	FFR	MWh	MW delivered between 2 and 10 seconds
Primary Operating Response	POR	MWh	MW delivered between 5 and 15 seconds
Secondary Operating Response	SOR	MWh	MW delivered between 15 to 90 seconds
Tertiary Operating Response 1	TOR1	MWh	MW delivered between 90 seconds to 5 minutes
Tertiary Operating Response 2	TOR2	MWh	MW delivered between 5 minutes to 20 minutes
Replacement Reserve - Synchronised	RRS	MWh	MW delivered between 20 minutes to 1 hour
Replacement Reserve - desynchronised	RRD	MWh	MW delivered between 20 minutes to 1 hour
Ramping Margin 1	RM1	MWh	The increased MW output that can be delivered with a good degree of certainty for the given time horizon.
Ramping Margin 3	RM3	MWh	
Ramping Margin 8	RM8	MWh	
Fast Post Fault Active Power Recovery	FPFAPR	MWh	Active power (MW) >90% within 250ms of voltage >90%
Steady state Reactive Power	SSRP	Mvarh	(MVAr capability)*(% of capacity that MVAr capability is achievable)
Dynamic Reactive Response	DRR	MWh	MVAr capability during large (>30%) voltage dips

[1] Further detail on the DS3 System Services can be found at: http://www.eirgridgroup.com/how-the-grid-works/ds3-programme/

1.3. Purpose of Document

The purpose of this consultation paper is to set out the proposed amendments to the Protocol document as contained in the marked up version associated with this consultation. The Protocol document specifies the compliance requirements which a service provider must satisfy before being paid for DS3 System Services. In addition, it specifies the Performance Monitoring procedures to be applied. It also contains operational requirements, specifying minimum standards that Providing Units must meet.

Following feedback from industry, proposals to modify the Performance Monitoring section (section 5) have been included in this consultation. The context for these changes has been included in section 2.2. It should be noted that the Performance Monitoring process detailed in the Protocol document relates to the assessment of Providing Units' delivery of contracted DS3 System Services only.

Proposed modifications to the Protocol document were also presented in the DS3 System Services Fixed Contracts consultation[2], published on 25 October 2018 and closing on 6 December 2018. Section 6 of that consultation presented the changes to the Protocol document as they related to the inclusion of the Availability Performance Scalar. Due to the overlap of these two consultations, the proposed changes presented in the Fixed Contracts consultation have also been included as part of this consultation.

Lastly, minor modifications have been proposed to the Protocol document to correct any housekeeping errors, to ease the understanding of, and further develop the requirements and procedures being presented.

1.4. Proposed Consultation Process

1. Section 2 of this paper presents an overview of the main differences, minor and major, between the DS3 System Services Protocol – Regulated Arrangements, 12 December 2017, Version 1.0 and the proposed marked up version accompanying this paper.
2. A number of consultation questions address the major modifications to the Protocol document. These are spread throughout section 2.2 and repeated in summary form at the end of the paper. A template questionnaire accompanies the consultation paper for the submission of comments.

[2] http://www.eirgridgroup.com/site-files/library/EirGrid/DS3-System-Services-Fixed-Contracts-consultation.pdf

2. Overview of changes to the Protocol document

2.1 Minor Changes

1. Sections 3.1 and 3.3.1: Proposed changes made to account for Wind Farm Power Stations and Solar PV Providing Units.
2. Section 3.3.4: Proposed clarification on appropriate DSU or AGU actions during a Frequency Event.
3. Section 3.4.1: Proposed changes take into account potential conflict with Grid Code requirements for synchronous units with FFR provision.
4. Section 3.4.1: Proposed clarification makes reference to Section 5.25.
5. Section 3.4.1: Two Operational Requirements relating to FFR Provision with Dynamic Capability are deleted.
    a. The Operational Requirement relating to eligibility for an FFR Fast Response Scalar value greater than 1 has been removed as this will be evaluated during the testing and procurement processes.
    b. The Operational Requirement relating to eligibility for an FFR Dynamic Trajectory Scalar value greater than 0.2 has been removed as this will be evaluated during the testing and procurement processes.
6. Section 3.4.1: Proposed clarification that the Providing Unit should provide a linear response to changes in Transmission System Frequency. The original text had the same meaning but was found to be unclear.
7. Section 5: Proposed additional wording to provide clarification on minimum data requirements. Clarification followed through in Section 5, Table 3.
8. Section 5.2: Proposed amendments in line with I-SEM changes and to account for RM8 product horizon.
9. Section 5.2: Proposed amendment to the length of time (12months increased to 24months) that the value of P_A will be set equal to 1 to account for delays in the establishment of adequate systems and processes.
10. Section 5.4: Proposed clarification of descriptions of the Performance Incident Response Factor (P_E) and the Monthly Scaling Factor (K_m).
11. Section 5.5.2: Proposed change as a result of proposed Fixed Contracts (Volume Capped) arrangements.
12. Section 5.6.1: Proposed inclusion of FFR with other reserve services (previously Section 5.12).
13. Section 5.7: See Section 3 of this consultation paper for description of proposed changes. Proposed deletions of 'Multiple Frequency Events' in each product section is due to section 5.7.1.3 being added on the same subject.
14. Sections 5.8, 5.9, 5.10 & 5.11: Proposed changes made as a result of proposed modification to Section 5.7.

15. Sections 5.8.2.6, 5.9.2.5, 5.10.2.5 & 5.11.1.2: Proposed change made to the calculation of the Performance Incident Scaling Factor (Q_i) in order to simplify the calculation. It is proposed that Q_i will only be calculated if the expected response of the Providing Unit is greater than 1 MW.
16. Section 5.11.1.1 (new): Proposed alignment of FFR Time Zero assessment methodology for performance monitoring with POR, SOR & TOR1 Time Zero assessment methodology.
17. Sections 5.13 & 5.14: Proposed amendment of both sections (TOR2 and RRS respectively, previously Sections 5.10 and 5.11) due to moving from Reserve Category Performance Assessment to Ramping Category Performance Assessment.
18. Section 5 Figures 5 & 7: Proposed updates to flow diagrams (previously Figures 5, 6 and 8) to reflect actual process and to take account of the proposed changes in this consultation.
19. Section 5 Table 5: Proposed updates to account for all services.
20. Section 6 (new): See Section 3 of this consultation for description of change.
21. Glossary: Proposed amendments and new definitions added to account for proposed changes in this consultation.

2.2 Major Changes

2.2.1. TOR2 and RRS assessment – Section 5 modifications (5.5.1, 5.12, 5.13, 5.14, 5.15)

The TOR2 and RRS services were not previously independently assessed and the Performance Incident Response Factors for both services were set as equal to the Providing Unit's TOR1 Response Factor.

As both TOR2 and RRS are offered as dispatchable services by many Providing Units, an assessment where the response factors are set as equalling the TOR1 Response Factor is not appropriate. Also, TOR2 testing is carried out based upon the method of performance assessment for Ramping Margin.

As such, the TSOs propose to amend the assessment of both services to a methodology aligned with that carried out for ramping margin services. In the first instance, the Response Factors for both TOR2 and RRS will be set equal to the Performance Incident Response Factor calculated for RM1. The Response Factors may move to an independent service-based assessment, based upon Ramping Margin methodology, at a later time.

Question 1: Do you have any comments on the assessment methodology for these services being amended to align with Ramping Margin assessment methodology?

2.2.2. Definition of a Frequency Event - Section 5.7 modifications

There has been a reduction in the number of Significant Frequency Disturbances experienced by the power system in recent years, particularly disturbances resulting in transients with a nadir of less than 49.50Hz. The number of transient events has, however, remained somewhat consistent over the period, the trend being a reduction in the magnitude of the events.

Therefore, under the current definition of a Frequency Event, Providing Units are not meeting the Minimum Data Records Requirement and consequently this results in a reduction in the Providing Unit's Data Poor Performance Scalar. To reset the Data Poor Performance Scalar Service Providers have been requesting Performance Testing (Section 5.26 Protocol Document).

While the TSOs have historically reported upon events when Transmission System Frequency has gone below 49.70Hz (or above 50.30Hz), unit performance during the transient only impacted upon the unit's Performance Incident Response Factor (PE) in cases where a frequency nadir of 49.50Hz was experienced. The TSOs propose to redefine the term Frequency Event making reference to a Significant Frequency Disturbance where system frequency deviates from nominal by 0.30Hz. Therefore, all Significant Frequency Disturbances with a nadir of 49.70Hz (or a zenith of 50.30Hz for units contracted to provide high frequency response) will now be utilised in determining the unit's Performance Incident Response Factor (PE).

Question 2: Do you have any comments on the Frequency Event definition being amended to make reference to a Significant Frequency Disturbance, which is now defined as a deviation of 0.30Hz from Nominal Frequency?

2.2.3. Frequency Event Time Zero – Section 5.7.1.1 modifications

Previously the DS3 System Services Protocol document made reference to a Frequency Event End time stating that a Frequency Event ended when the Transmission System Frequency recovered to above 49.80Hz. The TSOs are proposing to move away from an approach whereby a Frequency Event is deemed to have ended in favour of an approach where a Frequency Event is solely described by its Time Zero. The event would therefore have no specific duration or end time

and instead each of the reserve services would be assessed based upon the individual reserve service timeframes.

The Time Zero (T) for a Frequency Event is the time at which the Transmission System Frequency first passes through the Reserve Trigger of the Providing Unit. All frequency reserve services will be assessed relative to this Time Zero. For Providing Units which have a Reserve Trigger value higher than 49.80Hz or lower than 50.20Hz, Time Zero shall be determined as being the time when the Transmission System Frequency first passes through 49.8Hz or 50.2Hz respectively. This provides an alignment with assessment of FFR, POR, SOR and TOR1 services.

The removal of reference to an end time in conjunction with the changes proposed to Section 5.7.1.3 (see Section 2.2.5 of this consultation) of the Protocol Document are designed to simplify the Performance Assessment process.

Question 3: Do you have any comments on the application of the Time Zero definition being amended and the removal of the reference to the end of a Frequency Event?

2.2.4. Pre-Event Frequency and Output – Section 5.7.1.2 modifications

The Pre-Event Output and Pre-Event Frequency were formerly measured as a mean value between the times of T-30 and T-60 seconds from the event start time. In some circumstances however this definition did not result in accurate pre-event conditions being determined, (e.g. if providing units were ramping or the system was experiencing oscillations pre-event). The proposed change would result in both Pre-Event Output and Pre-Event Frequency being assessed at a time closer to the start of the event, Time Zero. The proposal is from T-1.5 to T-0.5 seconds.

The TSOs acknowledges that on certain occasions (where there is significant variation in the Transmission System Frequency during the T-1.5 – T-0.5 seconds) issues may arise when determining both parameters. In such circumstances we propose to revert to the original timeframe (T-30 to T-60 seconds) for analysing both parameters.

Question 4: Do you have any comments on the amendment to the methodology for calculating Pre-Event Frequency and Pre-Event Output?

2.2.5. Multiple Frequency Events – Section 5.7.1.3 modifications

As Power system operation and operational policy develop, it is important that performance monitoring principles are updated to take this into account. When operating the system with lower levels of system inertia, it is vitally important that Providing Units perform during all transients regardless of the transient characteristics, for example if it is an independent Frequency Event or forms part of a sequence of multiple events. While secondary trips are not likely to occur often, the impact of a secondary trip or a multiple event is now potentially greater on a lighter system, thus it is important that Providing Units continue to perform during secondary or multiple transients.

Currently the DS3 System Services Protocol document states that if one or more subsequent Performance Incidents occur within 5 minutes after the end of the Frequency Event the Providing Unit's response to the subsequent Performance Incident(s) will not be taken into account for Performance Assessment purposes. Following queries from industry, the TSOs propose to move away from this approach, in favour of an approach where individual Significant Frequency Disturbances are analysed independently regardless if a second or multiple Frequency Event occurs.

The proposal would see secondary or subsequent frequency events now analysed as separate Significant Frequency Disturbances, and the performance assessments for the initial Significant Frequency Disturbance would be limited to only those services which have uninterrupted assessment periods (i.e. no subsequent Significant Frequency Disturbance occurs during the service's assessment period).

This proposed change is designed to simplify the Performance Assessment process in conjunction with the changes proposed to Section 5.7.1.1 (see Section 2.2.3 of this consultation) of the Protocol Document.

Question 5: Do you have any comments on the proposal to amend the process for analysing multiple frequency events?

2.2.6. The Availability Performance Scalar – Section 6 modifications

The inclusion of an Availability Performance Scalar was recommended by the TSOs and approved in SEM-18-049. The value of the Availability Performance Scalar will depend on the Total Availability Factor. This relationship is as per the above decision paper.

Question 6: Do you have any comments on the proposed inclusion relating to Availability Performance Monitoring for providers under the Fixed Contracts arrangements?

3. Summary of Consultation Questions

Question 1: Do you have any comments on the assessment methodology for these services being amended to align with Ramping Margin assessment methodology?

Question 2: Do you have any comments on the Frequency Event definition being amended to make reference to a Significant Frequency Disturbance, which is now defined as a deviation of 0.30Hz from Nominal Frequency?

Question 3: Do you have any comments on the application of the Time Zero definition being amended and the removal of the reference to the end of a frequency event?

Question 4: Do you have any comments on the amendment to the methodology for calculating Pre-Event Frequency and Pre-Event Output?

Question 5: Do you have any comments on the proposal to amend the process for analysing multiple frequency events?

Question 6: Do you have any comments on the proposed inclusion relating to Availability Performance Monitoring for providers under the Fixed Contracts arrangements?

4. Next Steps

SONI and EirGrid welcome feedback on the proposed changes to the Protocol document. Responses should be submitted to DS3@soni.ltd.uk or DS3@EirGrid.com by 18 January 2018 (using the associated template spreadsheet for comments). It would be helpful if responses to the questions included justification and explanation.

If you require your response to remain confidential you should clearly state this on the coversheet of the response. We intend to publish all non-confidential responses. Please note that, in any event, all responses will be shared with the Regulatory Authorities.