

Power systems management and associated
information exchange - Data and communications
security - Part 8: Role-based access control for power
system management

EESTI STANDARDI EESSÕNA

NATIONAL FOREWORD

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**Power systems management and associated information
exchange - Data and communications security - Part 8: Role-
based access control for power system management
(IEC 62351-8:2020)**

Gestion des systèmes de puissance et échanges
d'informations associés - Sécurité des communications et
des données - Partie 8: Contrôle d'accès basé sur les rôles
pour la gestion de systèmes de puissance
(IEC 62351-8:2020)

Energiemanagementsysteme und zugehöriger
Datenaustausch - IT-Sicherheit für Daten und
Kommunikation - Teil 8: Rollenbasierte Zugriffskontrolle für
Energiemanagementsysteme
(IEC 62351-8:2020)

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European foreword

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IEC 60870-5-104	NOTE	Harmonized as EN 60870-5-104
IEC 61784 (series)	NOTE	Harmonized as EN IEC 61784 (series)
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IEC 61850-8-2	NOTE	Harmonized as EN IEC 61850-8-2
IEC 61968 (series)	NOTE	Harmonized as EN 61968 (series)
IEC 61970 (series)	NOTE	Harmonized as EN 61970 (series)
IEC 62351-7:2017	NOTE	Harmonized as EN 62351-7:2017 (not modified)
IEC 62351-9	NOTE	Harmonized as EN 62351-9
IEC 62351-14	NOTE	Harmonized as EN IEC 62351-14 ¹
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¹ To be published. Stage at the time of publication: prEN IEC 62351-14:2019.

Annex ZA

(normative)

Normative references to international publications with their corresponding European publications

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

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<u>Publication</u>	<u>Year</u>	<u>Title</u>	<u>EN/HD</u>	<u>Year</u>
IEC 61850-7-2	-	Communication networks and systems for power utility automation - Part 7-2: Basic information and communication structure - Abstract communication service interface (ACSI)	EN 61850-7-2	-
IEC/TS 62351-2	-	Power systems management and associated information exchange - Data and communications security - Part 2: Glossary of terms	-	-
IEC 62351-3	2014	Power systems management and associated information exchange - Data and communications security - Part 3: Communication network and system security - Profiles including TCP/IP	EN 62351-3	2014
+ A2	2020		+ A2	2020
IEC 62351-4	-	Power systems management and associated information exchange - Data and communications security - Part 4: Profiles including MMS and derivatives	EN IEC 62351-4	-
IEC/TS 62351-8	2011	Power systems management and associated information exchange - Data and communications security - Part 8: Role-based access control	-	-
RFC 2865	-	Remote Authentication Dial In User Service (RADIUS)	-	-
RFC 5246	-	The Transport Layer Security (TLS) Protocol Version 1.2	-	-

RFC 5288	-	AES Galois Counter Mode (GCM) Cipher Suites for TLS)	-	-
RFC 5289	-	TLS Elliptic Curve Cipher Suites with SHA-256/384 and AES Galois Counter Mode (GCM)	-	-
RFC 5755	-	An Internet Attribute Certificate Profile for Authorization	-	-
RFC 5878	-	Transport Layer Security (TLS) Authorization Extensions	-	-
RFC 6749	-	The OAuth 2.0 Authorization Framework	-	-
RFC 7519	-	JSON Web Token (JWT)	-	-
XACML-RBAC	2014	XACML v3.0 Core and Hierarchical Role Based Access Control (RBAC) Profile Version 1.0, October 2014.	-	-

INTERNATIONAL STANDARD

NORME INTERNATIONALE



**Power systems management and associated information exchange – Data and communications security –
Part 8: Role-based access control for power system management**

**Gestion des systèmes de puissance et échanges d'informations associés –
Sécurité des communications et des données –
Partie 8: Contrôle d'accès basé sur les rôles pour la gestion de systèmes de
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INTERNATIONAL STANDARD

NORME INTERNATIONALE



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Part 8: Role-based access control for power system management**

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Sécurité des communications et des données –
Partie 8: Contrôle d'accès basé sur les rôles pour la gestion de systèmes de puissance**

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Steffen Fries	WG15	2017-05-30	Enhancement of OID, More details regarding the RADIUS profile. Clarification of relationship to PULL and PUSH models, which led to a re-write of the current description focussing solely on LDAP		
Steffen Fries	WG15	2017-07-28	Enhancement of the area of responsibility section. Standard of profile specific parameters in the access token.		
Frances Cleveland	Steffen Fries	2017-08-31	Editorial updates		2017-9-22
Steffen Fries	Frances Cleveland	2017-09-22	Further Updates of the RADIUS profile with an index option to allow for multiple roles per user with different AoR or Revision Deprecation of Profile C		
Steffen Fries		2017-11-22	Further description of Profile D and application integration examples. Deletion of existing Profile C		
Steffen Fries		2018-02-22	Update on RADIUS, Inclusion of custom based role definition		
Steffen Fries		2018-04-30	Refinement of custom based role definition using XACML as proposed in IEC 62351-90-1		
Steffen Fries		2018-06-22	Aligned terminology of rights and permissions throughout the document, refinement of mandatory permissions, inclusion of JWT (based on the contribution of Arijit Bose) as Profile C. Introduction of security events (incidents and warnings) supporting IEC 62351-14.		
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POWER SYSTEMS MANAGEMENT AND ASSOCIATED INFORMATION EXCHANGE - DATA AND COMMUNICATIONS SECURITY –

Part 8: Role-based access control for power system management

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Enquiry draft	Report on voting
57/2180/FDIS	57/2197/RVD

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INTRODUCTION

This document provides a standard for access control in power systems. The power system environment supported by this document is enterprise-wide and extends beyond traditional borders to include external providers, suppliers, and other energy partners. Driving factors are the liberalization of the energy sector to include many more stakeholders, the increasingly decentralized generation of energy, and the need to control access to sensitive data of resources and stakeholders. This document supports a distributed security environment in which security is also a distributed service.

The power system sector is continually improving the delivery of energy by leveraging technical advances in computer-based applications. Utility operators, energy brokers and end-users are increasingly accessing multiple applications to deliver, transmit and consume energy in a personalized way. These disparate applications are naturally connected to a common network infrastructure that typically supports protection equipment, substation automation protocols, inter-station protocols, remote access and business-to-business services. Consequently, secure access to these distributed and often loosely coupled applications is even more important than access to an application running on a stand-alone device.

Secure access to computer-based applications involves authentication of the user to the application. After authentication, the types of interactions which that user can perform with the application is then determined. The use of local mechanisms for authorization creates a patchwork of approaches difficult to uniformly administer across the breadth of a power system enterprise. Each application decides with its own logic the authorization process. However, if applications can use a network to help manage access, a database can serve as a trusted source of user's group or role affiliation. Thus, the access to a shared user base can be controlled centrally. Each application can then examine the permissions listed for a subject and corresponding role and determine their level of authorization.

This document defines role-based access control (RBAC) for enterprise-wide use in power systems. It supports a distributed or service-oriented architecture where security is a distributed service and applications are consumers of distributed services.

In this document, the role of a user is transported in a container called an "access token" of that user to the object. Access tokens are created and administered by a (possibly federated) identity management tool. All access tokens have a lifetime and are subject to expiration. Prior to verification of the access token itself, the user transmitting the access token is authenticated by the object. The object trusts the management tool to issue access tokens with suitable lifetime. This enables local verification of the access token's validity at remote sites without the need to access a centralized repository (e.g. a centralized revocation list).

Four different access token formats are supported as four different profiles. Two of them are based on X.509 certificates and were already defined in IEC TS 62351-8. Two new profiles are defined as part of this document. The first new profile uses the JSON to encode the access token and the second new profile uses a vendor specific attribute in RADIUS to provide a migration option for environments already utilizing a RADIUS server to support access control. These access tokens may be bound to a specific transport or to a specific application. Common to all access token formats is the information contained, to allow a migration from one profile to another.

POWER SYSTEMS MANAGEMENT AND ASSOCIATED INFORMATION EXCHANGE - DATA AND COMMUNICATIONS SECURITY –

Part 8: Role-based access control for power system management

1 Scope

The scope of this part of IEC 62351 is to facilitate role-based access control (RBAC) for power system management. RBAC assigns human users, automated systems, and software applications (collectively called "subjects" in this document) to specified "roles", and restricts their access to only those resources, which the security policies identify as necessary for their roles.

As electric power systems become more automated and cyber security concerns become more prominent, it is becoming increasingly critical to ensure that access to data (read, write, control, etc.) is restricted. As in many aspects of security, RBAC is not just a technology; it is a way of running a business. RBAC is not a new concept; in fact, it is used by many operating systems to control access to system resources. Specifically, RBAC provides an alternative to the all-or-nothing super-user model in which all subjects have access to all data, including control commands.

RBAC is a primary method to meet the security principle of least privilege, which states that no subject should be authorized more permissions than necessary for performing that subject's task. With RBAC, authorization is separated from authentication. RBAC enables an organization to subdivide super-user capabilities and package them into special user accounts termed roles for assignment to specific individuals according to their associated duties. This subdivision enables security policies to determine who or what systems are permitted access to which data in other systems. RBAC provides thus a means of reallocating system controls as defined by the organization policy. In particular, RBAC can protect sensitive system operations from inadvertent (or deliberate) actions by unauthorized users. Clearly RBAC is not confined to human users though; it applies equally well to automated systems and software applications, i.e., software parts operating independent of user interactions.

The following interactions are in scope:

- local (direct wired) access to the object by a human user, a local and automated computer agent, or a built-in HMI or panel;
- remote (via dial-up or wireless media) access to the object by a human user;
- remote (via dial-up or wireless media) access to the object by a remote automated computer agent, e.g. another object at another substation, a distributed energy resource at an end-user's facility, or a control centre application.

While this document defines a set of mandatory roles to be supported, the exchange format for defined specific or custom roles is also in scope of this document.

Out of scope for this document are all topics which are not directly related to the definition of roles and access tokens for local and remote access, especially administrative or organizational tasks, such as:

- user names and password definitions/policies;
- management of keys and/or key exchange;
- engineering process of roles;
- assignment of roles;
- selection of trusted certificate authorities issuing credentials (access tokens);