

# ISO/IEC 29341-15-10:2011-09 (E)

## Information technology - UPnP Device Architecture - Part 15-10: Content Synchronization Device Control Protocol - Content Synchronization Service

---

### Contents

Page

1	Overview and Scope.....	4
1.1	Introduction.....	4
1.1.1	ContentSync Function.....	6
1.1.2	Media Server Device and ContentDirectory Service.....	6
1.2	Notation.....	7
1.2.1	Data Types.....	8
1.3	Vendor-defined Extensions.....	8
1.4	Namespace for ContentSync Service.....	8
1.5	References.....	8
2	Service Modeling Definitions.....	10
2.1	ServiceType.....	10
2.2	Terms.....	10
2.2.1	Synchronization Object and Pair.....	10
2.2.2	Synchronization Data Structure.....	11
2.2.3	Synchronization Policy and Behavior.....	12
2.2.4	Minimally Complete Synchronization Relationship Data Structure.....	15
2.3	Synchronization Data Structure Management.....	16
2.3.1	Synchronization Data Structure Addition.....	16
2.3.2	Synchronization Data Structure Modification.....	16
2.3.3	Synchronization Data Structure Deletion.....	17
2.4	Synchronization Operation (CDS to CDS).....	17
2.5	Synchronization Operation (CDS to non CDS).....	19
2.6	Garbage Collection.....	20
2.7	State Variables.....	20
2.7.1	<u><a href="#">SyncChange</a></u> .....	21
2.7.2	<u><a href="#">SyncStatusUpdate</a></u> .....	22
2.7.3	<u><a href="#">A_ARG_TYPE_ActionCaller</a></u> .....	28
2.7.4	<u><a href="#">A_ARG_TYPE_SyncData</a></u> .....	28
2.7.5	<u><a href="#">A_ARG_TYPE_SyncPair</a></u> .....	33
2.7.6	<u><a href="#">A_ARG_TYPE_SyncID</a></u> .....	33
2.7.7	<u><a href="#">A_ARG_TYPE_ObjectID</a></u> .....	33
2.7.8	<u><a href="#">A_ARG_TYPE_SyncStatus</a></u> .....	33
2.7.9	<u><a href="#">A_ARG_TYPE_ChangeLog</a></u> .....	34
2.7.10	<u><a href="#">A_ARG_TYPE_Index</a></u> .....	35
2.7.11	<u><a href="#">A_ARG_TYPE_Count</a></u> .....	35
2.7.12	<u><a href="#">A_ARG_TYPE_ResetObjectList</a></u> .....	35
2.8	Eventing and Moderation.....	36
2.9	Actions.....	36
2.9.1	<u><a href="#">AddSyncData()</a></u> .....	37
2.9.2	<u><a href="#">ModifySyncData()</a></u> .....	38
2.9.3	<u><a href="#">DeleteSyncData()</a></u> .....	40
2.9.4	<u><a href="#">GetSyncData()</a></u> .....	41
2.9.5	<u><a href="#">ExchangeSyncData()</a></u> .....	42
2.9.6	<u><a href="#">AddSyncPair()</a></u> .....	43
2.9.7	<u><a href="#">ModifySyncPair()</a></u> .....	44

2.9.8	<a href="#"><u>DeleteSyncPair()</u></a>	45
2.9.9	<a href="#"><u>StartSync()</u></a>	47
2.9.10	<a href="#"><u>AbortSync()</u></a>	48
2.9.11	<a href="#"><u>GetChangeLog()</u></a>	49
2.9.12	49	
2.9.13	<a href="#"><u>ResetChangeLog()</u></a>	50
2.9.14	<a href="#"><u>ResetStatus()</u></a>	51
2.9.15	51	
2.9.16	<a href="#"><u>GetSyncStatus()</u></a>	52
2.9.17	Non-Standard Actions Implemented by a UPnP Vendor	53
2.9.18	Common Error Codes	53
2.10	Theory of Operation	54
2.10.1	Introduction	54
2.10.2	CDS Synchronization	54
2.10.3	Synchronization of a Reference Object	72
3	XML Service Description	77
4	Test	82
Annex A	(normative) AV Working Committee Properties	83
A.1	Base Properties Overview	83
A.1.1	<a href="#"><u>@id</u></a>	83
A.2	Resource Encoding Characteristics Properties	83
A.2.1	<a href="#"><u>res@avcs:syncAllowed</u></a>	83
A.2.2	<a href="#"><u>res@avcs:resModified</u></a>	83
A.3	Content Synchronization-related Properties	84
A.3.1	<a href="#"><u>avcs:syncable</u></a>	84
A.3.2	<a href="#"><u>avcs:syncInfo</u></a>	84
A.3.3	<a href="#"><u>avcs:syncInfo@updateID</u></a>	85
A.3.4	<a href="#"><u>avcs:syncInfo::pair</u></a>	85
A.3.5	<a href="#"><u>avcs:syncInfo::pair@syncRelationshipID</u></a>	85
A.3.6	<a href="#"><u>avcs:syncInfo::pair@partnershipID</u></a>	85
A.3.7	<a href="#"><u>avcs:syncInfo::pair@pairGroupID</u></a>	86
A.3.8	<a href="#"><u>avcs:syncInfo::pair::remoteObjID</u></a>	86
A.3.9	<a href="#"><u>avcs:syncInfo::pair::remoteParentObjID</u></a>	86
A.3.10	<a href="#"><u>avcs:syncInfo::pair::virtualRemoteParentObjID</u></a>	86
A.3.11	<a href="#"><u>avcs:syncInfo::pair::policy</u></a>	86
A.3.12	<a href="#"><u>avcs:syncInfo::pair::status</u></a>	87
Annex B	(normative) Syncable Objects and Properties	88
B.1	Deciding Syncability of CDS Object	88
B.2	Synchronization of CDS object properties (Informative)	89
Figure 1	— Content Synchronization Model	4
Figure 2	— High-level Synchronization Flow Diagram	5
Figure 3	— Unidirectional Contents Synchronization	6
Figure 4	— ContentSync Function	6
Figure 5	— Types of Synchronization Pair	11
Figure 6	— Synchronization Data Structure	12
Figure 7	— Interaction Diagram (Synchronization Operation)	17

Figure 8 — Synchronization Relationship between two CDSs .....	55
Figure 9 — Synchronization Relationship between two CDSs .....	73
Table 1-1 — Namespace Definitions .....	8
Table 2-1 — State Variables .....	20
Table 2-2 — Status Codes of Synchronization Operation.....	27
Table 2-3 — Event Moderation.....	36
Table 2-4 — Actions .....	37
Table 2-5 — Arguments for <a href="#"><u>AddSyncData()</u></a> .....	38
Table 2-6 — Error Codes for <a href="#"><u>AddSyncData()</u></a> .....	38
Table 2-7 — Arguments for <a href="#"><u>ModifySyncData()</u></a> .....	39
Table 2-8 — Error Codes for <a href="#"><u>ModifySyncData()</u></a> .....	40
Table 2-9 — Arguments for <a href="#"><u>DeleteSyncData()</u></a> .....	41
Table 2-10 — Error Codes for <a href="#"><u>DeleteSyncData()</u></a> .....	41
Table 2-11 — Arguments for <a href="#"><u>GetSyncData()</u></a> .....	41
Table 2-12 — Error Codes for <a href="#"><u>GetSyncData()</u></a> .....	42
Table 2-13 — Arguments for <a href="#"><u>ExchangeSyncData()</u></a> .....	42
Table 2-14 — Error Codes for <a href="#"><u>ExchangeSyncData()</u></a> .....	42
Table 2-15 — Arguments for <a href="#"><u>AddSyncPair()</u></a> .....	44
Table 2-16 — Error Codes for <a href="#"><u>AddSyncPair()</u></a> .....	44
Table 2-17 — Arguments for <a href="#"><u>ModifySyncPair()</u></a> .....	45
Table 2-18 — Error Codes for <a href="#"><u>ModifySyncPair()</u></a> .....	45
Table 2-19 — Arguments for <a href="#"><u>DeleteSyncPair()</u></a> .....	46
Table 2-20 — Error Codes for <a href="#"><u>DeleteSyncPair()</u></a> .....	46
Table 2-21 — Arguments for <a href="#"><u>StartSync()</u></a> .....	47
Table 2-22 — Error Codes for <a href="#"><u>StartSync()</u></a> .....	48
Table 2-23 — Arguments for <a href="#"><u>AbortSync()</u></a> .....	48
Table 2-24 — Error Codes for <a href="#"><u>AbortSync()</u></a> .....	49
Table 2-25 — Arguments for <a href="#"><u>GetChangeLog()</u></a> .....	50
Table 2-26 — Error Codes for <a href="#"><u>GetChangeLog()</u></a> .....	50
Table 2-27 — Arguments for <a href="#"><u>ResetChangeLog()</u></a> .....	51
Table 2-28 — Error Codes for <a href="#"><u>ResetChangeLog()</u></a> .....	51
Table 2-29 — Arguments for <a href="#"><u>ResetStatus()</u></a> .....	51
Table 2-30 — Error Codes for <a href="#"><u>ResetStatus()</u></a> .....	52
Table 2-31 — Arguments for <a href="#"><u>GetSyncStatus()</u></a> .....	52
Table 2-32 — Error Codes for <a href="#"><u>GetSyncStatus()</u></a> .....	53
Table 2-33 — Common Error Codes .....	53
Table 2-34 — Actions for example sequence.....	56
Table A.1 — Content Synchronization-related Properties Overview .....	84
Table B.1 — Syncability of CDS object class.....	88
Table B.2 — Syncability of CDS Object property .....	90