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The Printer Working Group

Imaging System State and Counter MIB v2.0

Status: Approved

Abstract: This document defines the PWG Imaging System State and Counter (ISC) MIB v2.0 that supports monitoring of system-, service-, and subunit-level state and counters on imaging devices (dedicated systems) and imaging servers (multipurpose systems). The ISC MIB can be used for fleet management, enterprise billing, field service, and other applications. The ISC MIB is entirely freestanding, but it also facilitates use of the IETF Host Resources MIB [RFC1514] [RFC2790] and IETF Printer MIB [RFC1759] [RFC3805] for imaging device and imaging server monitoring. The ISC MIB was developed by the PWG's Web-based Imaging Management Service (WIMS) project and is based on the PWG Imaging System Counters specification [PWG5106.1].

This document is a PWG Candidate Standard. For a definition of a “PWG Candidate Standard”, see ftp://ftp.pwg.org/pub/pwg/general/pwg-process20.pdf

This document is available at:

ftp://ftp.pwg.org/pub/pwg/candidates/cs-wimscountmib20-20080318-5106.3.pdf

The ASN.1 source for the ISC MIB is available at:
ftp://ftp.pwg.org/pub/pwg/candidates/cs-wimscountmib20-20080318-5106.3.mib

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In general, a PWG standard is a specification that is stable, well understood, and is technically competent, has multiple, independent and interoperable implementations with substantial operational experience, and enjoys significant public support.

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1 Introduction

This document defines the PWG Imaging System State and Counter (ISC) MIB v2.0 that supports monitoring of system-, service-, and subunit-level state and counters on imaging devices (dedicated systems) and imaging servers (multipurpose systems). The ISC MIB can be used for fleet management, enterprise billing, field service, and other applications. The ISC MIB is entirely free-standing, but it also facilitates use of the IETF Host Resources MIB [RFC1514] [RFC2790] and IETF Printer MIB [RFC1759] [RFC3805] for imaging device and imaging server monitoring. The ISC MIB was developed by the PWG's Web-based Imaging Management Service (WIMS) project and is based on the PWG Imaging System Counters specification [PWG5106.1].

2 Terminology

2.1 Conformance Terminology

The key words "MUST", "MUST NOT", "REQUIRED", "SHOULD", "SHOULD NOT", "RECOMMENDED", "MAY", and "OPTIONAL" in this document are to be interpreted as defined in [RFC2119].

2.2 Imaging Terminology

Normative definitions and semantics of the following imaging terms are imported from the PWG Imaging System Counters spec [PWG5106.1]:

```
Availability (class of System and Service counters)
Auxiliary (subclass of Work counters)
Blank Image (unit of Work)
Black Impression (unit of Work)
Blank Impression (unit of Work)
Device (abstract object)
Down Mode (condition of System or Service)
Datastream (subclass of Work counters)
Full Color Image (unit of Work)
Full Color Impression (unit of Work)
Highlight Color Impression (unit of Work)
Image (unit of Work)
Impression (unit of Work)
Job (unit of Monitoring counters)
Maintenance (subclass of Work counters)
Maintenance Mode (condition of System or Service)
Media Used (class of System and Service counters)
Message (unit of Work)
Monitoring (class of System and Service counters)
Monochrome Image (unit of Work)
Monochrome Impression (unit of Work)
Sheet (of hardcopy medium)
System (abstract object)
Two Sided Impression
User Mode (condition of System or Service)
Waste (subclass of Work counters)
Work (class of System and Service counters)
WorkTotals (class of Work counters)
```


2.2.1 Service

The normative definition and semantics of the imaging term Service (an abstract object) are imported from the PWG Imaging System Counters specification [PWG5106.1], including the standard set of Service types imported from the 'JmJobServiceTypesTC' textual convention in the IETF Job Monitoring MIB [RFC2707]:

```
Copy (scan and print)
EmailIn (input email messages)
EmailOut (output email messages)
FaxIn (input PSTN fax images)
FaxOut (output PSTN fax images)
NetworkFaxIn (input network fax images)
NetworkFaxOut (output network fax images)
Print (output hardcopy impressions)
Scan (input softcopy images)
```

The PWG Imaging System Counters specification [PWG5106.1] also defines the following additional Service types:

```
Transform (convert document format)
SystemTotals (top-level Imaging System)
```

2.2.2 Subunit

The normative definition and semantics of the imaging term Subunit (an abstract object) are imported from IETF Printer MIB v2 [RFC3805], including the standard set of Subunit types imported from the 'PrtAlertGroupTC' textual convention:

```
Console (local console)
Cover (cover, door, or interlock)
InputTray (input media container)
OutputTray (output media container)
Marker (output Sheet impression marker)
MediaPath (from input tray to output tray)
Channel (input job channel)
Interpreter (interpreter or transformer)
```

This document defines the following additional Subunit types:

```
Finisher (hardcopy finisher)
Interface (hardware port associated with a Channel)
Scanner (softcopy image scanner)
Stapler
StitcherFolder
Binder
Trimmer
DieCutter
Puncher
Perforater
Slitter
SeparationCutter
Imprinter
Wrapper
Bander
MakeEnvelope
Stacker
SheetRotator
Inserter
ScannerADF
ScannerPlaten
```


3 Requirements

3.1 Rationale for Imaging System State and Counter MIB

The PWG Imaging System Counters specification [PWG5106.1] defines:

(a) A rationale for abstract counters for Imaging Systems.

(b) A set of use models for monitoring and billing, management, and accounting using these abstract counters.

(c) A set of design requirements for these abstract counters.

(d) A set of abstract counters that satisfies these design requirements.

(e) A set of conformance requirements for implementations of these abstract counters in Imaging Systems.

In order to implement these abstract counters they MUST be mapped into a concrete encoding and transferred from Imaging Systems to monitoring applications via a concrete protocol. Currently, the most widely implemented system management protocol on Imaging Systems is SNMP [RFC3410]. Therefore, this document defines a standard mapping of these abstract counters into SMIv2 [RFC 2578] that is accessible via any version of SNMP [RFC3584].

3.2 Use Models of Imaging System State and Counter MIB

3.2.1 Network Server

The ISC MIB MAY be implemented by a network server (typically running other non-imaging applications) that supports one or more downstream imaging devices.
If the network server implements the IETF Host Resources MIB [RFC1514] [RFC2790], then it SHOULD implement a row in the 'hrDeviceTable' with an appropriate 'hrDeviceType' for each downstream imaging device supported and it SHOULD implement rows in the 'hrSWInstalledTable' and the 'hrSWRunTable' for each local imaging service supported.

3.2.2 Imaging Device

The ISC MIB MAY be implemented by an imaging device (typically running an embedded operating system and possibly multiple imaging services).
If the imaging device implements the IETF Host Resources MIB [RFC1514] [RFC2790], then it SHOULD implement a row in the 'hrDeviceTable' with an appropriate 'hrDeviceType' for each local imaging device supported and it SHOULD implement rows in the 'hrSWInstalledTable' and the 'hrSWRunTable' for each local imaging service supported.

3.3 Design Requirements for Imaging System State and Counter MIB

(1) The ISC MIB design MUST follow all object naming and MIB structuring requirements defined in IETF SMIv2 [RFC2578].

(2) The ISC MIB design SHOULD follow all best practices defined in IETF Guidelines for Authors and Reviewers of MIB Documents [RFC4181].

(3) The ISC MIB design MUST include all abstract counters defined in the PWG Imaging System Counters specification [PWG5106.1].

(4) The ISC MIB design MUST NOT require implementation of any version of the IETF Host Resources [RFC1514] [RFC2790] or IETF Printer MIB [RFC1759] [RFC3805] (for low cost of implementation).

(5) The ISC MIB design MUST include System-level counters (see all use models in [PWG5106.1] and in this document).
(6) The ISC MIB design MUST include Service-level state and counters and efficient 'direct lookup' of Service keys (see all use models in [PWG5106.1] and in this document).
(7) The ISC MIB design MUST support extensions for new Service types (see section 3.2 'Imaging System Services' in [PWG5106.1] and section 4 'Data Classes' in the PWG Semantic Model/1.0 [PWG5105.1]).
(8) The ISC MIB design SHOULD include Subunit-level state and counters and efficient 'direct lookup' of Subunit keys (see all use models in [PWG5106.1]).
(9) The ISC MIB design SHOULD support extensions for new Subunit types (see section 2.2 'Printer Sub-Units' in IETF Printer MIB [RFC1759] [RFC3805]).
(10) The ISC MIB design SHOULD support extensions for Job-level counters (see all use models in [PWG5106.1] and IETF Job Monitoring MIB [RFC2707]).
(11) The ISC MIB design SHOULD include counter notifications (e.g., new service created) in order to implement efficient fleet management and accounting applications.
(12) The ISC MIB design SHOULD be fine-grained (e.g., defining two-sided impression counters and overall impression counters in separate object groups) in order to support clear conformance requirements and to minimize implementation costs.

4 Overview of Imaging System State and Counter MIB

4.1 Structure of Imaging System State and Counter MIB

Before reading the ISC MIB you should be familiar with the contents of the PWG Imaging System Counters specification [PWG5106.1].
The ISC MIB is written in SMIv2 [RFC2578] and defines only 'read-only' objects. The ISC MIB does NOT define any 'read-write' or 'read-create' objects (i.e., SNMP Set operations are not supported). The ISC MIB also defines one notification (i.e., SNMP trap).
The ISC MIB defines five object groups that are mandatory for counter compliance (i.e., v1 compatibility):

- General Group - four scalar objects
- Key Group - one index and four columnar objects
- Service Group - two index and six columnar objects
- Time Group - two index and four columnar objects
- Monitor Group - two index and seventeen columnar objects

The ISC MIB defines six object groups that are conditionally mandatory for counter compliance (i.e., v1 compatibility):

- Subunit Group - two index and four columnar objects
- Image Group - three index and three columnar objects
- Impression Group - three index and five columnar objects
- Two Sided Group - three index and five columnar objects
- Sheet Group - three index and five columnar objects
- Traffic Group - three index and four columnar objects

The ISC MIB defines three object groups that are optional for counter compliance (i.e., v1 compatibility):

- Media Used Group - three index and nine columnar objects
- Subunit Map Group - two index and one columnar objects
- Alert Group - four index and five columnar objects

4.2 Indexing of Imaging System State and Counter MIB

The Key table in the ISC MIB supports “inverted” lookups and is analogous to the 'jmJobIDTable' in the IETF Job Monitoring MIB [RFC2707]. The Key table supports system allocation of an abstract key for each pair of:

(a) 'icServiceType' and 'icServiceIndex' for a Service; or
(b) 'icSubunitType' and 'icSubunitIndex' for a Subunit.

This abstract key allows both Services and Subunits to “share” the common counter tables.

The Service table in the ISC MIB supports *direct* lookup of the abstract key for each configured Service type and instance and is indexed by:

(1) A value from 'IcServiceTypeTC' that identifies the type of Service for the entry (e.g., copy, print, scan, etc.).
(2) A value of 'icServiceIndex' that identifies the instance of this type of Service.

The Subunit table in the ISC MIB supports *direct* lookup of the abstract key for each configured Subunit type and instance and is indexed by:

(1) A value from 'IcSubunitTypeTC' that identifies the type of Subunit for the entry (e.g., console, marker, channel, etc.).
(2) A value of 'icSubunitIndex' that identifies the instance of this type of Subunit.

The SubunitMap table in the ISC MIB supports *direct* lookup of the abstract key for each configured Subunit that is asociated with a given Service instance and is indexed by:

(1) A value of 'icServiceKey' that identifies the Service instance (via the ‘icKeyTable’).
(2) A value of ‘icSubunitKey’ that identifies the associated Subunit instance (via the ‘icKeyTable’).

The Time (Availability) and Monitor tables in the ISC MIB are indexed by:

(1) A value of 'icKeyIndex' that identifies the Service or Subunit instance.
(2) A value from 'IcPersistenceTC' that identifies the persistence of the entry (i.e., lifetime, since last reboot, or since last reset).

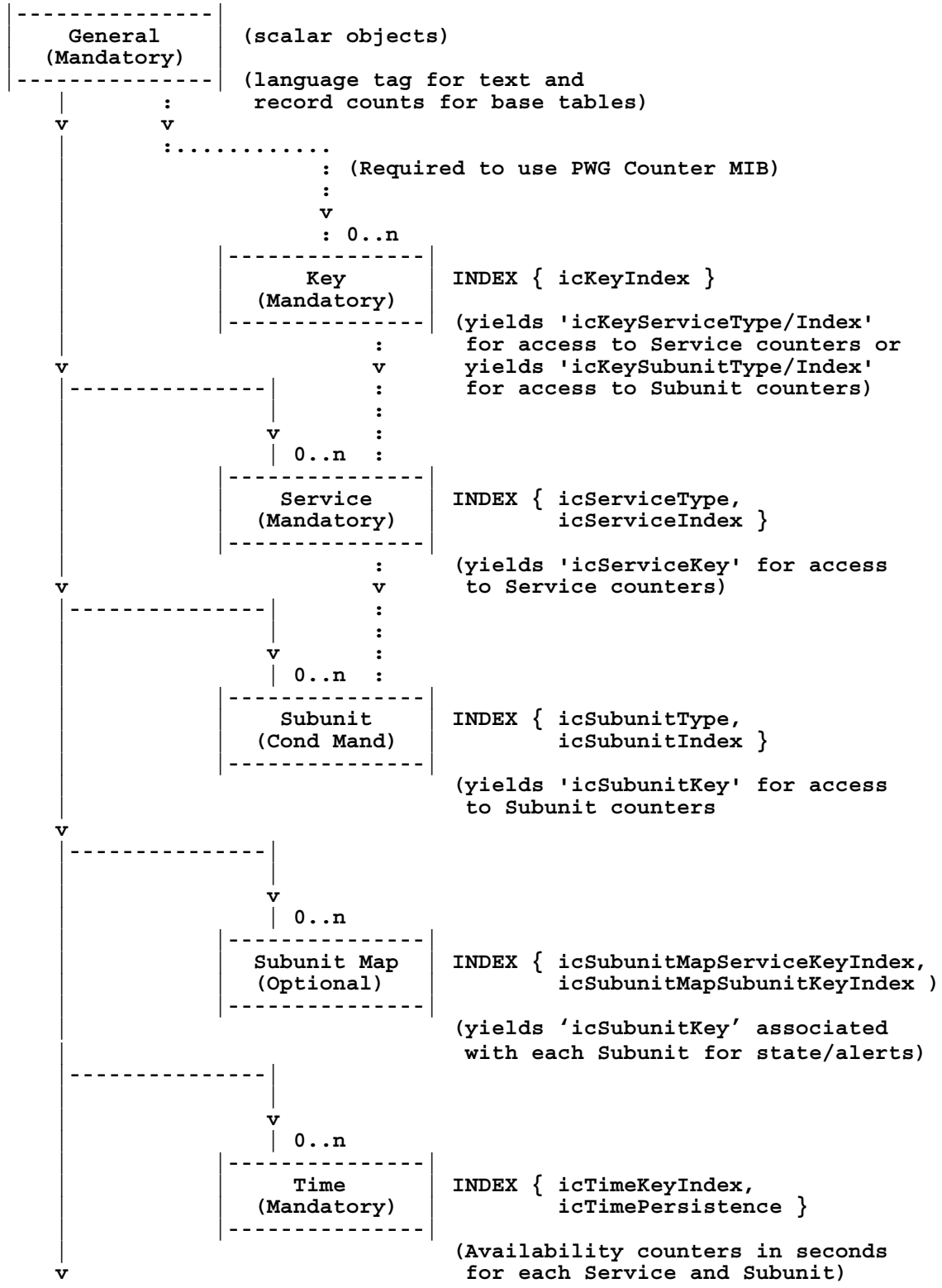
The Media Used and Alert tables in the ISC MIB are indexed by:

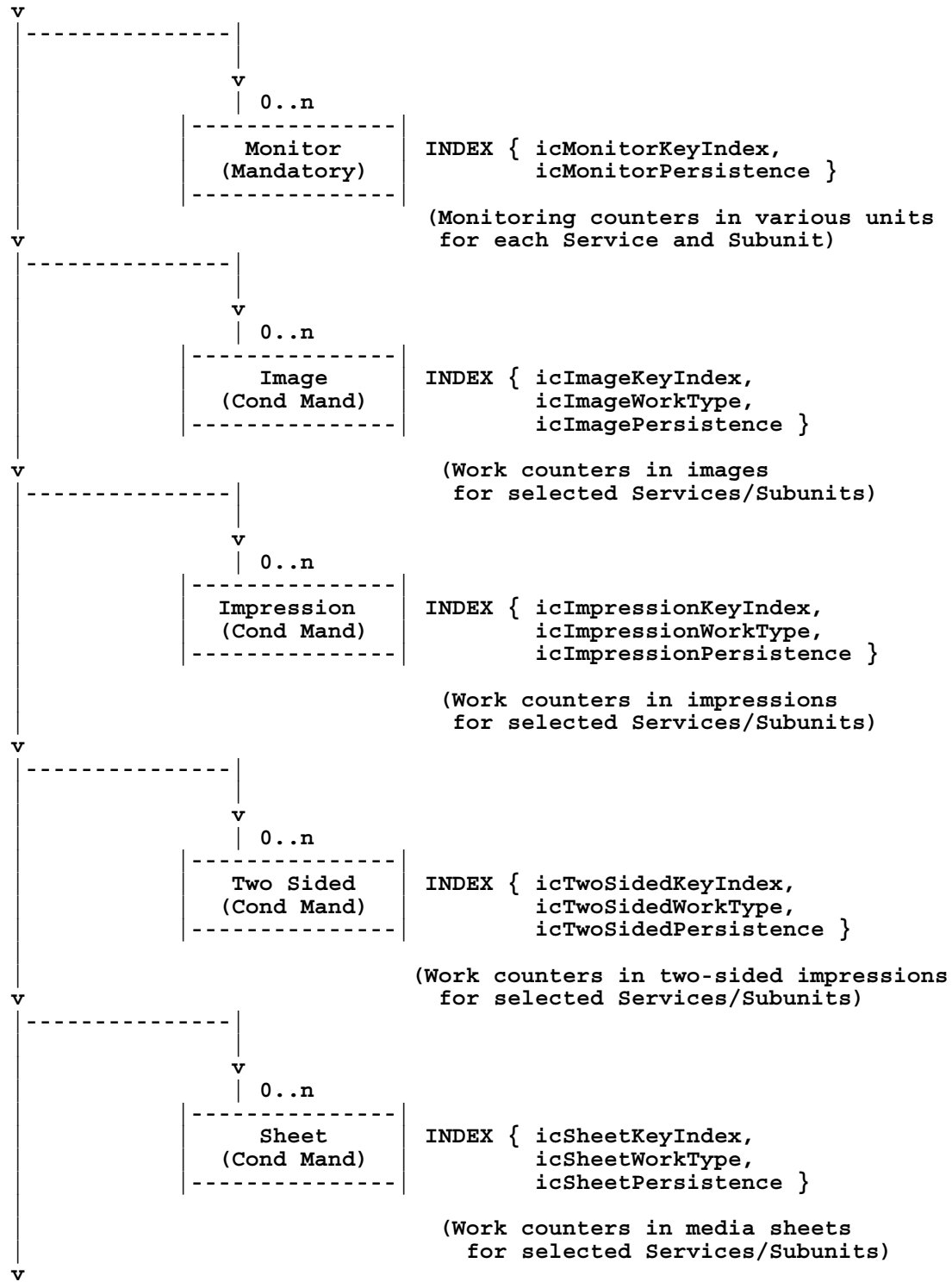
(1) A value of 'icKeyIndex' that identifies the Service or Subunit instance.
(2) For the Media Used and Alert tables only, a value of 'icXxxIndex' that identifies the instance of this entry.
(3) A value from 'IcPersistenceTC' that identifies the persistence of the entry (i.e., lifetime, since last reboot, or since last reset).

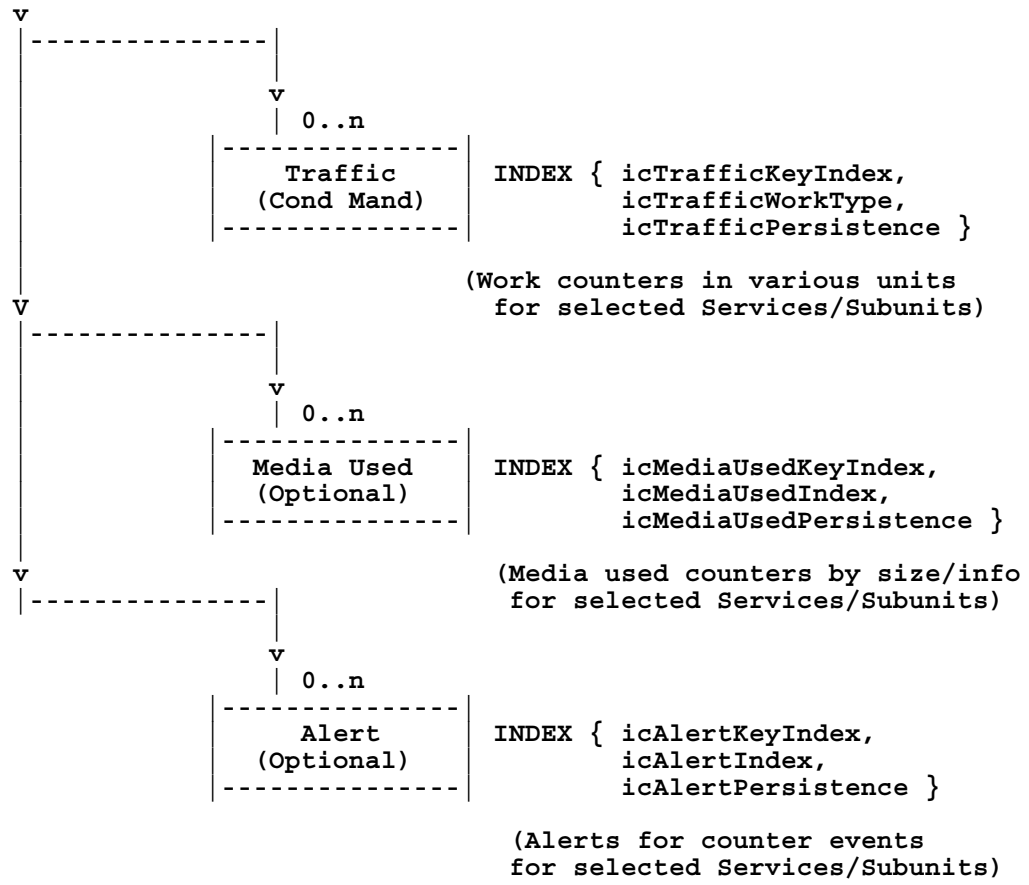
The Image, Impression, Two Sided, Sheet, and Traffic work counter tables in the ISC MIB are indexed by:

(1) A value of 'icKeyIndex' that identifies the Service or Subunit instance.
(2) A value from 'IcWorkTypeTC' that identifies the type of work for the entry (workTotals, datastream, auxiliary, waste, or maintenance).
(3) A value from 'IcPersistenceTC' that identifies the persistence of the entry (i.e., lifetime, since last reboot, or since last reset).

4.3 Diagram of Imaging System State and Counter MIB







4.4 Relationship to Other MIBs

4.4.1 Relationship to IANA Printer MIB and IANA Finisher MIB

The ISC MIB defines the 'icSubunitTypeTC' textual convention whose values are aligned with 'PrtAlertGroupTC' in the IANA Printer MIB (originally published in [RFC3805]) and with 'FinDeviceTypeTC' in the IANA Finisher MIB (originally published in [RFC3806]), for best interworking.

See: 'prtAlertGroup' in [RFC1759] [RFC3805].
See: 'PrtAlertGroupTC' in [RFC3805] and IANA Registry at:
http://www.iana.org/assignments/ianaprinter-mib
See: 'finDeviceType' in [RFC3806].
See: 'FinDeviceTypeTC' in [RFC3806] and IANA Registry at:
http://www.iana.org/assignments/ianafinisher-mib

4.4.2 Relationship to IETF MIB-II

The ISC MIB defines the 'icAlertTimeStamp' object, which MAY contain a value of 'sysUpTime' in the IETF MIB-II [RFC1213], as a relative timestamp (since last system boot).

` See: 'sysUpTime' in [RFC1213].

4.4.3 Relationship to IETF Host Resources MIB

The ISC MIB defines the 'icMonitorStorageAllocErrors' object, which is a generalization of the 'hrStorageAllocationFailures' object in the IETF Host Resources MIB [RFC1514] [RFC2790].

See: 'hrStorageAllocationFailures' in [RFC1514] [RFC2790].

The ISC MIB defines the 'icAlertDateAndTime' object, which MAY contain a value of 'hrSystemDate' in the IETF Host Resources MIB [RFC1514] [RFC2790], as an authoritative timestamp.

See: 'hrSystemDate' in [RFC1514] [RFC2790].

4.4.4 Relationship to IETF Printer MIB

The ISC MIB defines the 'icMonitorConfigChanges', 'icMonitorTotalAlerts', and 'icMonitorCriticalAlerts' objects, which are generalizations of the corresponding 'prtGeneralConfigChanges', 'prtAlertAllEvents', and 'prtAlertCriticalEvents' objects in IETF Printer MIB v2 [RFC3805].

See: 'prtGeneralConfigChanges' in IETF Printer MIB [RFC1759] [RFC3805].
See: 'prtAlertCriticalEvents' and 'prtAlertAllEvents'
in IETF Printer MIB v2 [RFC3805].

4.5 Mapping from PWG Imaging System Counters

The ISC MIB conforms to all best practices for MIBs written in SMIv2 [RFC2578], which required mapping from the abstract counters defined in the PWG Imaging System Counters specification [PWG5106.1], as follows:

(1) All ISC MIB object names are scoped by an unambiguous group (e.g., 'icGeneral') or table (e.g., 'icService') prefix.
(2) Some ISC MIB object names are abbreviated from the corresponding abstract counter names in [PWG5106.1] (e.g., 'Impressions' --> 'Imps'), to ensure that no ISC MIB object name is longer than 31 characters (to avoid common portability problems with MIB compilers).
(3) Some ISC MIB object names are modified in word order from the corresponding abstract counter names in [PWG5106.1] (e.g., 'BlankImpressionsTwoSided' --> 'TwoSidedBlankImpressions'), to ensure that each counter object name ends in a plural noun indicating the units of that counter (as recommended by SMIv2 [RFC2578]).
(4) All ISC MIB counter objects with common units (e.g., 'impressions') are grouped into separate tables (for support of fine-grained ISC MIB implementation conformance requirements).

4.5.1 Mapping from Abstract Counter Groups

Abstract counter groups defined in [PWG5106.1] are mapped to ISC MIB tables as follows:

Abstract Group	MIB Table	Counter Units
*Work	icImageTable	images
	icImpressionTable	impressions (Imps)
	icTwoSidedTable	impressions (Imps)
	**icSheetTable	sheets
	icTrafficTable	koctets (of messages), messages
MediaUsed	icMediaUsedTable	sheets
Availability	icTimeTable	seconds
Monitoring	icMonitorTable	config changes, alerts jobs, errors, warnings, koctets (of storage)

*Work = WorkTotals, Datastream, Auxiliary, Waste, and Maintenance

**icSheetTable = ISC MIB extension for work in sheets (e.g., finishing)

4.5.2 Mapping from Abstract Counter Elements

Abstract counter elements defined in [PWG5106.1] are mapped to ISC MIB columnar objects as follows:

Abstract Group/Element	ISC MIB Table/Object
[*Work]	[icImageTable]
Images	icImageTotalImages
MonochromeImages	icImageMonochromeImages
FullColorImages	icImageFullColorImages
[*Work]	[icImpressionTable]
Impressions	icImpressionTotalImps
MonochromeImpressions	icImpressionMonochromeImps
BlankImpressions	icImpressionBlankImps
FullColorImpressions	icImpressionFullColorImps
HighlightColorImpressions	icImpressionHighlightColorImps

[*Work]	[icTwoSidedTable]
ImpressionsTwoSided	icTwoSidedTotalImps
MonochromeImpressionsTwoSided	icTwoSidedMonochromeImps
BlankImpressionsTwoSided	icTwoSidedBlankImps
FullColorImpressionsTwoSided	icTwoSidedFullColorImps
HighlightColorImpressionsTwoSided	icTwoSidedHighlightColorImps
[*Work]	[icTrafficTable]
InputKOctets	icTrafficInputKOctets
OutputKOctets	icTrafficOutputKOctets
InputMessages	icTrafficInputMessages
OutputMessages	icTrafficOutputMessages
[*Work]	[**icSheetTable]
	icSheetTotalSheets
	icSheetMonochromeSheets
	icSheetBlankSheets
	icSheetFullColorSheets
	icSheetHighlightColorSheets
[MediaUsed]	[icMediaUsedTable]
Sheets	icMediaUsedTotalSheets
MonochromeSheets	icMediaUsedMonochromeSheets
BlankSheets	icMediaUsedBlankSheets
FullColorSheets	icMediaUsedFullColorSheets
HighlightColorSheets	icMediaUsedHighlightColorSheets
MediaSizeName	icMediaUsedMediaSizeName
MediaInfo	icMediaUsedMediaInfo
MediaName	icMediaUsedMediaName
MediaAccountingKey	icMediaUsedMediaAccountingKey
[Availability]	[icTimeTable]
TotalTime	icTimeTotalSeconds
DownTime	icTimeDownSeconds
MaintenanceTime	icTimeMaintenanceSeconds
ProcessingTime	icTimeProcessingSeconds
[Monitoring]	[icMonitorTable]
ConfigChanges	icMonitorConfigChanges
TotalAlerts	icMonitorTotalAlerts
CriticalAlerts	icMonitorCriticalAlerts
AbortedJobs	icMonitorAbortedJobs
CanceledJobs	icMonitorCanceledJobs
CompletedJobs	icMonitorCompletedJobs
CompletedFinisherJobs	icMonitorCompletedFinisherJobs
MemoryAllocErrors	icMonitorMemoryAllocErrors
MemoryAllocWarnings	icMonitorMemoryAllocWarnings
StorageAllocErrors	icMonitorStorageAllocErrors
StorageAllocWarnings	icMonitorStorageAllocWarnings
LocalStorageKOctets	icMonitorLocalStorageKOctets
RemoteStorageKOctets	icMonitorRemoteStorageKOctets

*Work = WorkTotals, Datastream, Auxiliary, Waste, and Maintenance

**icSheetTable = ISC MIB extension for work in sheets (e.g., finishing)

5 Definition of Imaging System State and Counter MIB

The compliable definition of the Imaging System State and Counter MIB is maintained in the PWG Candidates directory at:

ftp://ftp.pwg.org/pub/pwg/candidates/cs-wimscountmib20-20080318-5106.3.mib

6 Conformance Requirements

Conforming implementations of the ISC MIB for counters (see icMIBCompliance):

- MUST implement every object defined in the General, Key, Service, Time, and Monitor object groups (although no specific service type need be supported);
- MUST initialize every object to the DEFVAL clause (or an actual value) for each OBJECT-TYPE statement in the MIB;
- MUST implement every object conformance requirement specified in the SYNTAX, MAX-ACCESS, and DESCRIPTION clauses for each OBJECT-TYPE statement in the MIB;
- MUST implement every object and group conformance requirement specified in the 'icMIBCompliance' first MODULE-COMPLIANCE statement in the MIB.

Conforming implementations of the ISC MIB for state (see icMIBStateCompliance):

- MUST implement every object defined in the General, Key, Service object groups (for every specific service type supported);
- MUST initialize every object to the DEFVAL clause (or an actual value) for each OBJECT-TYPE statement in the MIB;
- MUST implement every object conformance requirement for state specified in the SYNTAX, MAX-ACCESS, and DESCRIPTION clauses for each OBJECT-TYPE statement in the MIB;
- MUST implement every object and group conformance requirement specified in the 'icMIBStateCompliance' second MODULE-COMPLIANCE statement in the MIB.

7 IANA and PWG Considerations

There are no IANA considerations for ISC MIB maintenance.

There are PWG considerations for ISC MIB maintenance for the
'IcCounterEventTypeTC',
'IcPersistenceTC',
‘IcServiceStateTC’,
'IcServiceTypeTC',
‘IcSubunitStatusTC’,
'IcSubunitTypeTC', and
'IcWorkTypeTC'
enumerated textual conventions.

Note: IcSubunitStatusTC takes values from PrtSubUnitStatusTC in the IANA Printer MIB originally published in Printer MIB v2 [RFC3805].

8 Internationalization Considerations

The ISC MIB fully conforms to the IETF Policy on Character Sets and Languages [RFC2277], as follows:

- The ISC MIB defines one scalar object 'icGeneralNaturalLanguage', used to specify a natural language tag (that conforms to [RFC4646]) for all localized text strings (e.g., 'en-US' for the 'English as spoken in US').
- The ISC MIB imports one textual convention 'SnmpAdminString', used to define localized text string objects in the UTF-8 [RFC3629] charset (under the control of the natural language tag specified in 'icGeneralNaturalLanguage').

9 Security Considerations

The ISC MIB does NOT define any 'read-write' or 'read-create' objects. Nonetheless, security considerations apply to the defined 'read-only' objects.

- The ISC MIB exposes a list of configured services in the 'icServiceType' and 'icServiceInfo' objects.
- The ISC MIB exposes the state of configured services in the ‘icServiceState’, ‘icServiceStateMessage’, and ‘icServicePrtAlertIndex’ objects.
- The ISC MIB exposes a list of configured subunits in the 'icSubunitType' and 'icSubunitInfo' objects.
- The ISC MIB exposes the state of configured subunits in the ‘icSubunitStatus’ and ‘icSubunitStatusMessage’ objects.

It is RECOMMENDED that implementers consider the security features as provided by the SNMPv3 framework (see [RFC3410], section 8), including full support for the SNMPv3 cryptographic mechanisms (for authentication and privacy).

Further, deployment of SNMP versions prior to SNMPv3 is NOT RECOMMENDED. Instead, it is RECOMMENDED to deploy SNMPv3 and to enable cryptographic security. It is then a customer/operator responsibility to ensure that the SNMP entity giving access to an instance of this MIB module is properly configured to give access to the objects only to those principals (users) that have legitimate access rights.

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14 Appendix A – Media Accounting Key Format (Normative)

Conforming Imaging State and Counter MIB implementations SHOULD construct values of 'icMediaUsedMediaAccountingKey' according to the following ABNF [RFC4234], for interoperability and user-friendly behavior.

The core productions DIGIT, HEXDIG, VCHAR are imported from [RFC4234].

> Note: The OPTIONAL media properties 'media-oid' and 'media-uuid' alone are sufficient to create unique values of 'icMediaUsedAccountingKey', but they are opaque and only suitable for machine processing.

media-accounting-key = media-property *[";" media-property]
; set of media properties concatenated into one accounting key

```
media-property      = media-back-coating /
                      media-color /
                      media-form-parts /
                      media-front-coating /
                      media-hole-count /
                      media-oid /
                      media-order-count /
                      media-pre-printed /
                      media-recycled /
                      media-size-name /
                      media-type /
                      media-uuid /
                      media-weight /
                      media-custom
```



```
media-back-coating  = "mbco" "=" keyword-or-name
    ; media back coating (e.g., 'glossy' or 'satin')
    ; see section 3.13.10 'media-front-coating and media-back-coating'
    ; in PWG 5100.3
    ; for complete list of standard keywords

media-color         = "mcol" "=" keyword-or-name
    ; media color name (e.g., 'white' or 'custom-media-color-mauve')
    ; see section 4 'Media Color Names' in PWG 5101.1
    ; for complete list of standard keywords and precise ABNF
    ; see also 'prtInputMediaColor' in RFC 3805

media-custom        = custom-tag "=" ( name / number )
    ; media custom property (e.g., 'chp-tooth=17')

media-form-parts    = "mpar" "=" integer
    ; media form parts (e.g., '1' or '3')
    ; see 'prtInputMediaFormParts' in RFC 3805

media-front-coating  = "mfco" "=" keyword-or-name
    ; media front coating (e.g., 'none' or 'matte')
    ; see section 3.13.10 'media-front-coating and media-back-coating'
    ; in PWG 5100.3
    ; for complete list of standard keywords

media-hole-count    = "mhol" "=" integer
    ; media pre-drilled hole count (e.g., '0' or '3')
    ; see section 3.13.6 'media-hole-count' in PWG 5100.3
    ; for standard range and semantics

media-oid           = "moid" "=" 1*DIGIT *[ "." 1*DIGIT ]
    ; media OID (object identifier) for size, etc.
    ; (e.g., '1.3.18.0.4.3.1.50' from Mixed Object Content Document
    ; Architecture Reference by IBM from the AFP Color Consortium)

media-order-count   = "mord" "=" integer
    ; media number of sheets in sequence (e.g., '3' for third-cut tabs)
    ; see section 3.13.7 'media-order-count' in PWG 5100.3
    ; for standard range and semantics

media-pre-printed   = "mpre" "=" keyword-or-name
    ; media pre-printed (e.g., 'blank' or 'letter-head')
    ; see section 3.13.15 'media-pre-printed' in PWG 5100.3
    ; for complete list of standard keywords

media-recycled      = "mrec" "=" keyword-or-name
    ; media recycled (e.g., 'none' or 'standard')
    ; see section 3.13.11 'media-reycled' in PWG 5100.3
    ; for complete list of standard keywords

media-size-name     = "msiz" "=" size-name
    ; media size name (e.g., 'na_letter_8.5x11in' or
    ; 'iso_a4_210x297mm')
    ; see section 5 'Media Size Self-Describing Names' in PWG 5101.1
    ; for complete list of standard keywords and precise ABNF
    ; see also 'prtInputMediaName' in RFC 3805
```



```
media-type          = "mtyp" "=" keyword-or-name
    ; media type name (e.g., 'stationery' or
    ; 'custom-media-type-splash')
    ; see section 3 'Media Type Names' in PWG 5101.1
    ; for complete list of standard keywords and precise ABNF
    ; see also 'prtInputMediaType' in RFC 3805

media-uuid          = "muid" "=" 32HEXDIG
    ; media UUID (128-bits encoded as 32 hexadecimal digits)
    ; see section 4.1 'Format' in UUID URN Namespace (RFC 4122)
    ; see also ISO/IEC 9834-8 | ITU-T Rec. X.667
    ; see also DCE: Remote Procedure Call (Open Group CAE C309)

media-weight        = "mwei" "=" integer
    ; media weight in grams per square meter
    ; see section 3.13.9 'media-weight-metric' in PWG 5100.3
    ; see also 'prtInputMediaWeight' in RFC 3805

custom-tag          = "c" vendor "-" keyword
    ; custom tag (e.g., 'chp-tooth')

vendor              = keyword
    ; vendor (e.g., 'hp' or 'ibm')

keyword-or-name     = keyword / name
    ; standard keyword or custom name
    ; see section 4.1.3 'keyword' and section 4.1.2 'name' in
    ; RFC 2911

keyword             = lowalpha *[ lowalpha / DIGIT / "-" ]
    ; standard keyword
    ; (lowercase, digit, hyphen - no dot or underscore)
    ; see section 4.1.3 'keyword' in RFC 2911

name                = 1*VCHAR
    ; custom name (visible US-ASCII - no space, semicolon, equal sign)
    ; see section 4.1.2 'name' in RFC 2911

size-delimiters     = ( %x5F / "." )
    ; underscore for size parts and dot (decimal point) for dimensions
    ; see section 5 'Media Size Self-Describing Names' in PWG 5101.1

size-name           = 1*[ keyword / name / size-delimiters ]
    ; see section 5 'Media Size Self-Describing Names' in PWG 5101.1

integer             = 1*DIGIT
    ; unsigned integer number (e.g., '0' or '123')

lowalpha            = %x61-7A
    ; lowercase alpha (a-z)

number              = integer [ "." integer ]
    ; unsigned integer or real number (e.g., '7' or '1.34')
```

