

Cloud Computing Overview

Robert Bohn, PhD

**NIST Cloud Computing Program Manager
NIST Information Technology Laboratory**

CITEL

El Salvador, San Salvador
September 12, 2012

NIST INFORMATION TECHNOLOGY LABORATORY CLOUD

COMPUTING PROGRAM

Outline

- NIST Definition of Cloud Computing
- NIST Cloud Computing Reference Architecture
- Cloud Computing Standards Developers
- NIST Cloud Computing Related Publications

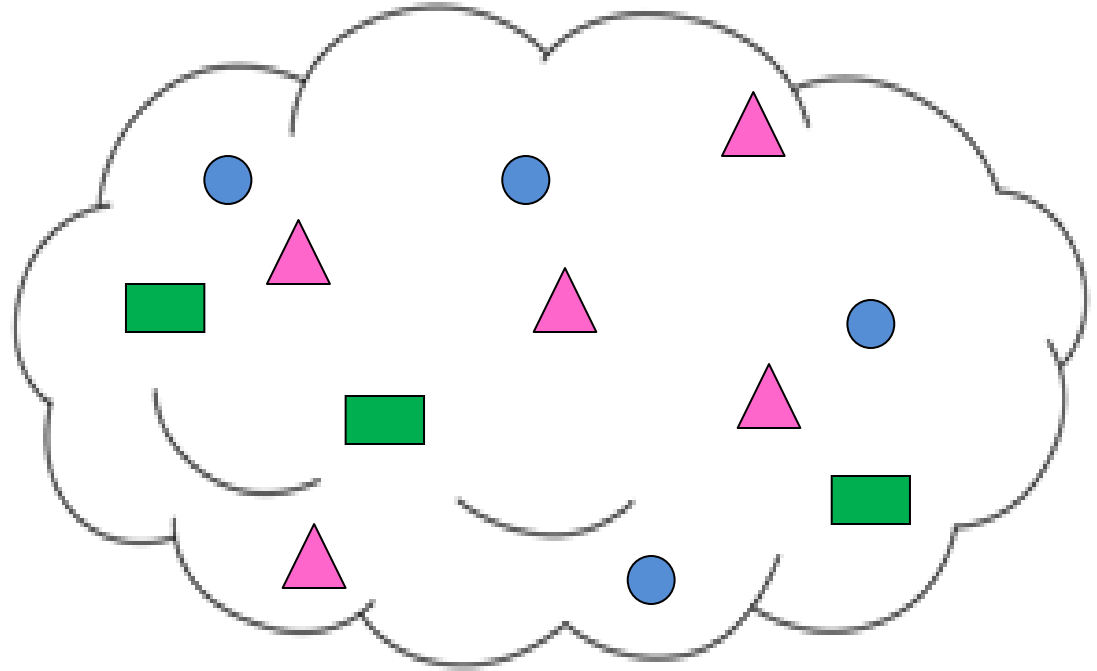
NIST Definition of Cloud Computing

“Cloud computing is a model for enabling convenient, on-demand network access to a shared pool of configurable computing resources (e.g., networks, servers, storage, applications, and services) that can be rapidly provisioned and released with minimal management effort or service provider interaction.”

- 3 Service Models**
- Software as a Service (SaaS)
 - Platform as a Service (PaaS)
 - Infrastructure as a Service (IaaS)

- 4 Deployment models**
- Public, Private, Community, Hybrid

- 5 Essential Characteristics**
- On demand self-service
 - Broad network access
 - Resource Pooling
 - Rapid Elasticity
 - Measured Service



Determine the “What” of Cloud Computing, not the “How”

NIST INFORMATION TECHNOLOGY LABORATORY CLOUD

COMPUTING PROGRAM

NIST Cloud Computing Reference Architecture ⁴

Actors and their Roles

Cloud Consumer

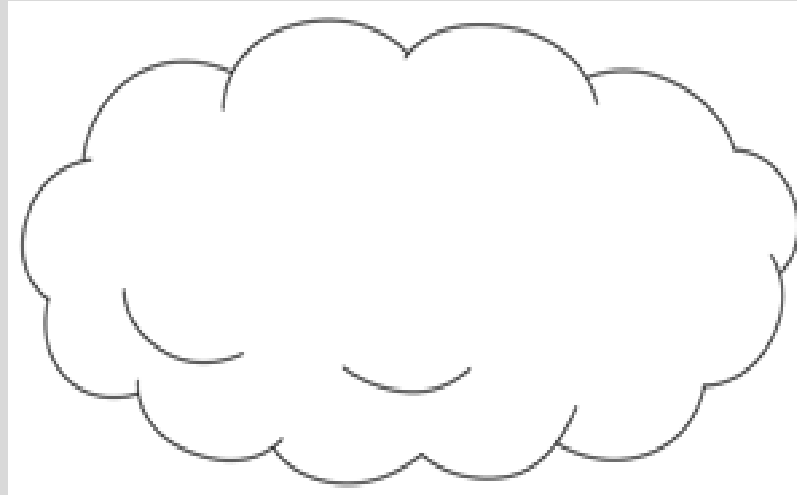
Person or organization that maintains a business relationship with, and uses service from *Cloud Providers*.

Cloud Auditor

A party that can conduct independent assessment of cloud services, information system operations, performance and security of the cloud implementation.

Cloud Provider

Person, organization or entity responsible for making a service available to *Cloud Consumers*.



Cloud Broker

An entity that manages the use, performance and delivery of cloud services, and negotiates relationships between *Cloud Providers* and *Cloud Consumers*.

Cloud Carrier

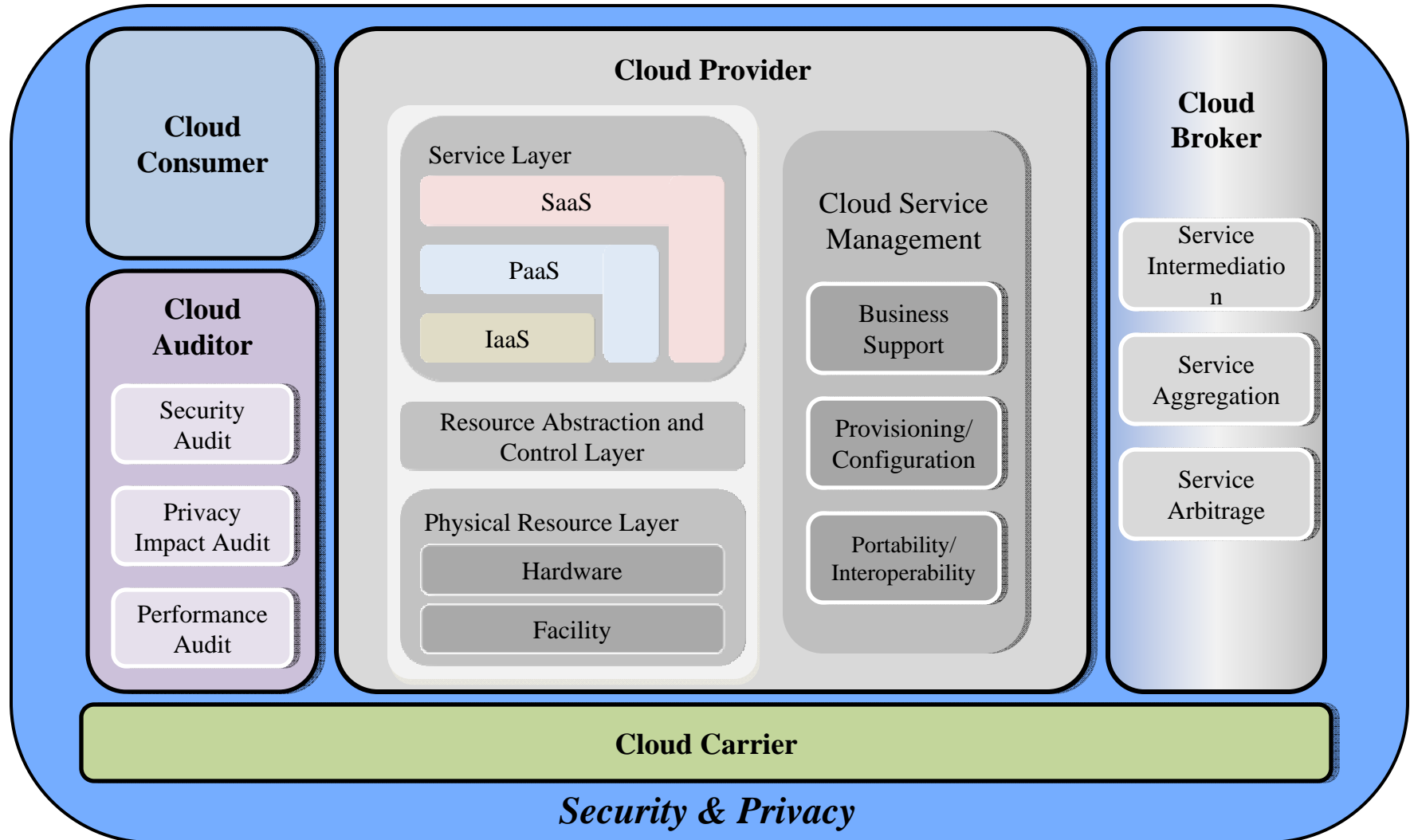
The intermediary that provides connectivity and transport of cloud services from *Cloud Providers* to *Cloud Consumers*.

NIST INFORMATION TECHNOLOGY LABORATORY CLOUD

COMPUTING PROGRAM

The NIST Cloud Computing Reference Architecture

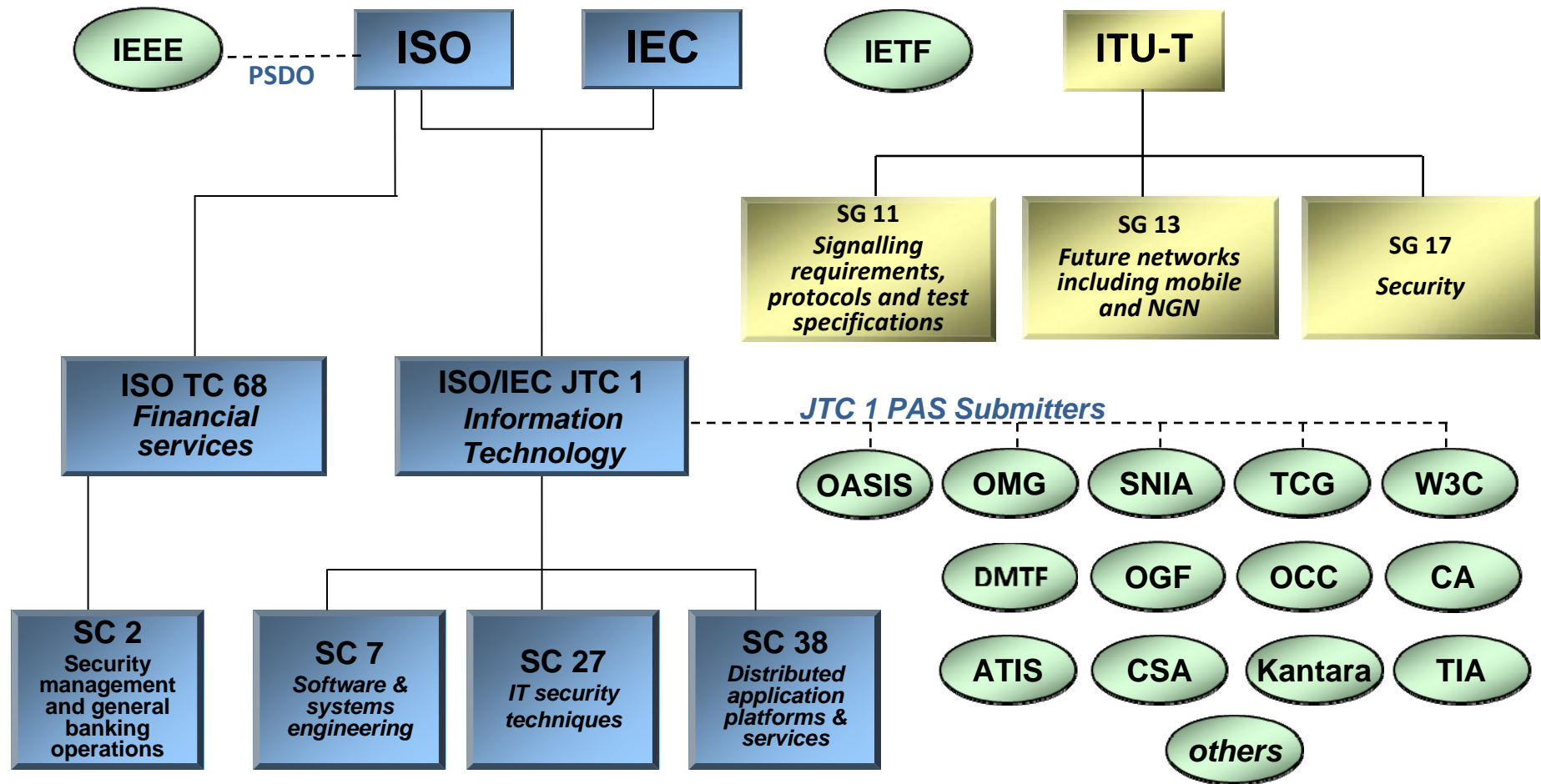
5



NIST INFORMATION TECHNOLOGY LABORATORY CLOUD

COMPUTING PROGRAM

Cloud Computing Standards Developers



Key: PSDO = Partner Standards Development Organization; PAS = Publicly Available Specification; = private sector, national member-based international standards body; = UN agency, member state-based international standards body; = international consortium standards developer

NIST INFORMATION TECHNOLOGY LABORATORY CLOUD

COMPUTING PROGRAM

NIST Cloud Computing Special Publications

- CC Standards Roadmap500-291
- CC Reference Architecture.....500-292
- USG CC Technology Roadmap Draft.....500-293

- Guidelines on Security and Privacy800-144
- Definition of Cloud Computing800-145
- CC Synopsis & Recommendations.....800-146

Searchable as “NIST SP xxx-nnn”

NIST INFORMATION TECHNOLOGY LABORATORY CLOUD

COMPUTING PROGRAM

Questions?

NIST Cloud Computing Collaboration Site

<http://collaborate.nist.gov/twiki-cloud-computing/>

NIST Cloud Computing Home Page

<http://www.nist.gov/itl/cloud>

Contact:

Dawn Leaf dawn.leaf@nist.gov

Robert Bohn robert.bohn@nist.gov

NIST INFORMATION TECHNOLOGY LABORATORY CLOUD

COMPUTING PROGRAM

Backup Slides

- Background
- Taxonomy
- Example: Cloud Consumer/Provider Activities

Background

- Technological Maturity
- Economic
- Standards Driven
 - Data Portability
 - Service Interoperability
 - Security
 - *Accessibility*
 - *Performance*

Taxonomies

Taxonomy: The science of categorization, or classification, of things based on a predetermined system. (Webopedia)

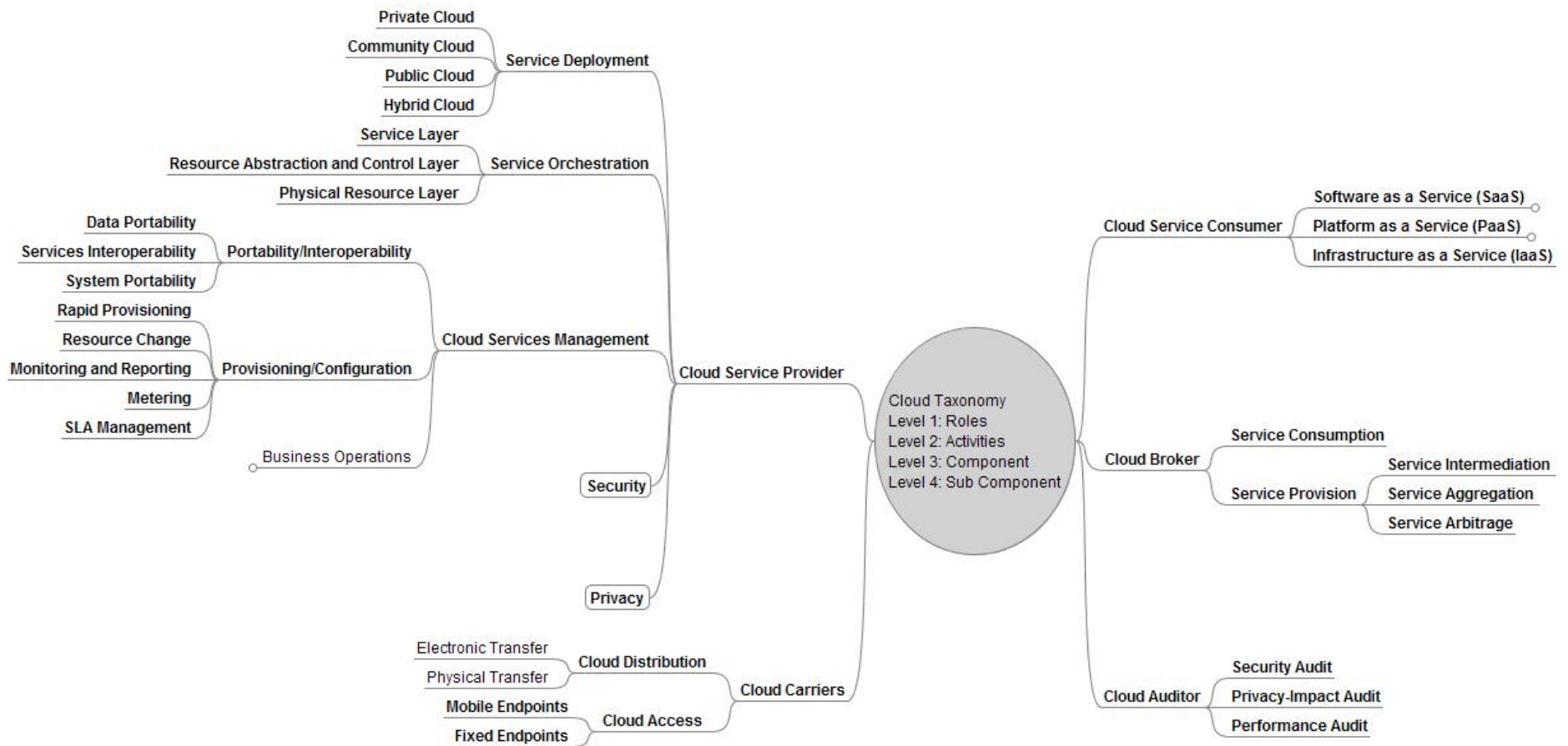
Main Attributes:

- Typically a controlled vocabulary with a hierarchical tree-like structure
- Terms in a taxonomy have relationships with other terms
- Usually in the form of a parent (broader) / child (narrower)

Benefits:

- Encompasses and labels all significant concepts within a given domain
- Allows users to understand the context of each label

RA Taxonomy



Examples Terms and Definitions

Level 1:

- **Cloud Service Provider** – Person, organization or higher-level system responsible for making a *service* available to *service consumers*.

Level 2:

- **Cloud Service Management** – Cloud Service Management includes all the service-related functions that are necessary for the management and operations of those services required by or proposed to customers.

Level 3:

- **Public Cloud** - The cloud infrastructure is made available to the general public or a large industry group and is owned by an organization selling cloud services. [NIST Definition of Cloud Computing]

Level 4:

- **Data Portability** – The ability to transfer data from one system to another without being required to recreate or reenter data descriptions or to modify significantly the application being transported. [Federal Standard 1037C]

Cloud Consumer/Provider Activities

Service Model	Consumer Activities	Provider Activities
SaaS	Uses application/service for business process operations	Installs, manages, maintains and supports the software application on a cloud infrastructure.
PaaS	Develops, tests, deploys and manages applications hosted in a cloud environment	Provisions and manages cloud infrastructure and middleware for the platform consumers; provides development, deployment and administration tools to platform consumers.
IaaS	Creates/installs, manages and monitors services for IT infrastructure operations	Provisions and manages the physical processing, storage, networking and the hosting environment and cloud infrastructure for IaaS consumers.