



## UEN Technical Services Network Standards and Procedures

**Policy** ..... June 13, 2001

**Standards** ..... June 13, 2001

### Procedures

Adding and Removing Network Devices..... Work In Progress

IP address assignments..... March 21, 2001

Pilot Testing ..... Work in Progress

**Network Naming Conventions** ..... June 13, 2001

### Routers and Switches

Global Parameters .....

    IP Classless..... Work in Progress

    IP CEF..... Work in Progress

    DNS Servers..... Work in Progress

    System Management ..... April 11, 2001

    Static Routes ..... Work in Progress

Access Lists..... Work in Progress

Distribute Lists ..... Work in Progress

Interfaces .....

    Interface Descriptions..... May 16, 2001

    Route caching..... Work in Progress

    Bandwidth..... Work in Progress

Routing Protocols..... Work in Progress

Network Protocols..... Work in Progress

Security Implementations..... Work in Progress

Port Configuration ..... Work in Progress

VTP Domains..... Work in Progress

Trunk Protocols..... Work in Progress

### Software

Approved IOS versions..... Work in Progress

Approved COS version..... Work in Progress

## **Policy**

The Utah Education Network requires that all network devices adhere to approved configuration standards. This ensures compliance with strategic directions and engineering standards, thereby increasing network availability, feature functionality and support capability. Only approved configurations can be implemented on production devices. The Technology Director can only approve exceptions to this policy.

This is a living document and will be continually updated as technologies and UEN requirements change. Any questions or requests for additions or deletions to this document should be directed to NOC management.

## **Standards**

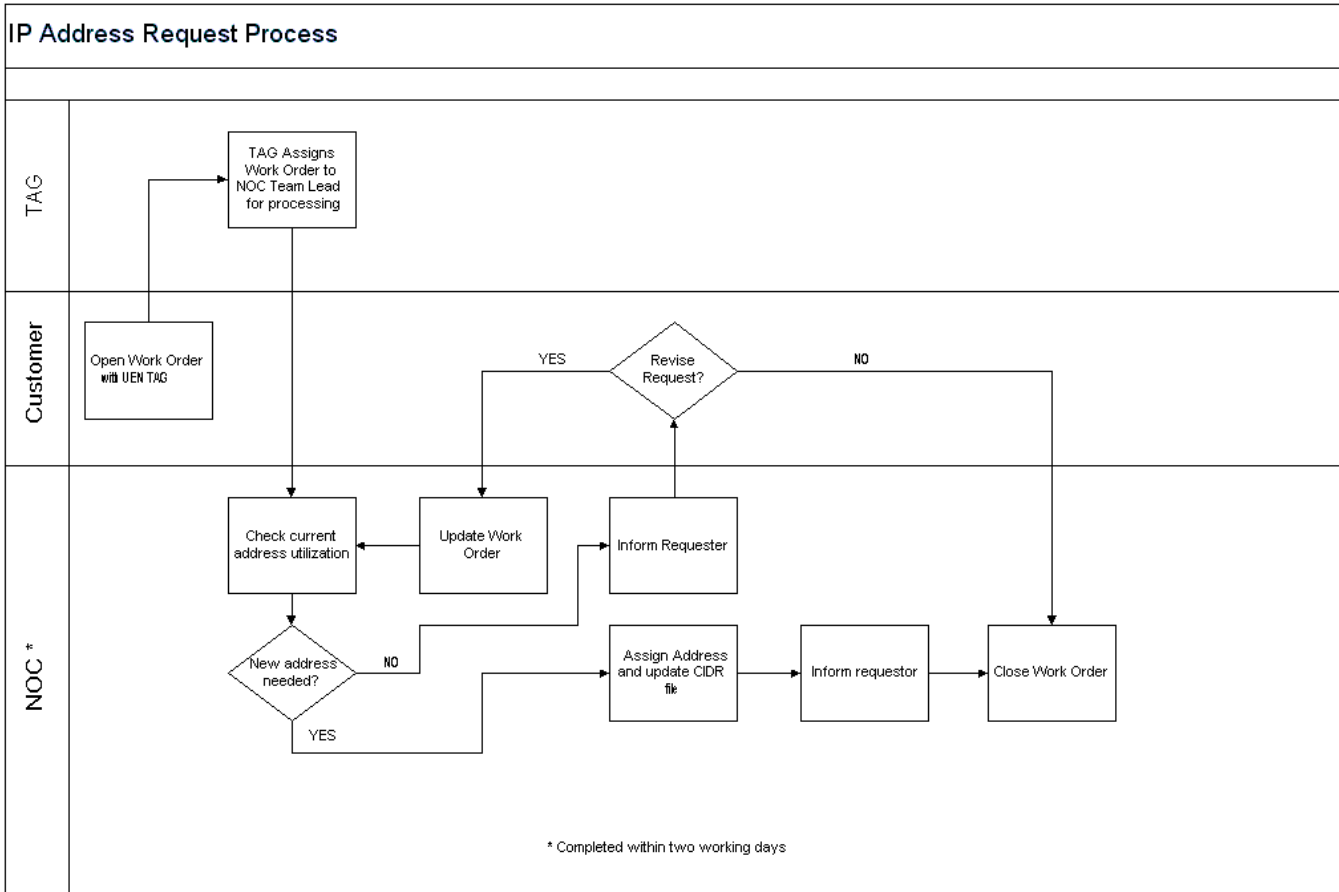
All UEN network implementations will follow the standards and procedures described below. Any implementation not covered in this document, should be identified and brought to the attention of UEN management for consideration and inclusion in UEN Technical Services Standards and Procedures.

## Procedures

### IP Address Assignments

Assigning IP networks from the CIDR blocks assigned to UEN is a responsibility of the NOC. To request a new assignment, a change, or removal of an assignment proceed as follows:

- Open a Remedy ARS work order describing the request and assign to the NOC team leader. Please include as many specifics as possible in order to expedite your request. If you do not have access to the ARS system, contact the TAG who will open a request for you.
- The request will be processed within 2 working days.
- The ARS work order will be assigned to a member of the NOC to review the request, determine the need and validity (which may include an evaluation of currently assigned networks and percentage of use), and process accordingly.
- The IP assignment will be made and recorded in the following location:  
export/home/CIDR/
- The NOC will inform the requestor of the IP assignment and close the ARS work order.



### Network Device Naming Conventions

### 24 Character DNS Naming Convention 18 Character Device Naming Convention

Device Type	Region/HUB Code	Location Description
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<b>GW</b>	<b>UEN</b>	<b>CORE1</b>
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2 Characters

This field is to be used as the Device Type identifier.

**\*\* NOTE:** In the case where the device is a Server "SV" or Client "CL" the Location Description should be the Server/Client's given name.

3 Characters

This field is to be used as the School District, Library or Core/HUB site identifier. In the case of the device being part of a School District, the 3 letter code used in this field will be based on the list of School District codes defined in this document.

**Examples:**  
BOX = Boxelder School Dist.  
UEN = UEN Core/HUB Devices  
LIB = Public Library

Detailed Character Codes for this field are defined below.

up to 9 Characters

This field is to be used as the location Identifier and allows for quantification of devices based on a number. It is intended to be as descriptive as possible within the allotted number of characters.

**\*\* NOTE:** In the case where the device is located at a secondary school or District Office, the description Must end with the appropriate designator:

**Examples:**  
CORE1 = Core Router #1  
SnoCanyHS = Snow Canyon High School  
GraniteDO = Granite District Office  
HighIndMS = Highland Middle School  
UnvofUtah = University of Utah  
SnoColSou = Snow College South

**Device Type Codes:**  
GW = Gateway/Router  
SW = Switch Device  
VO = Voice Router  
CO = CODEC Device  
MG = MGX Device  
PR = Proxy Server  
SV = UEN Server  
CL = UEN Client  
MW = Microwave Radio  
PS = Manged UPS

**District School Identifier:**  
HS = High School  
MS = Middle School  
JH = Junior High School  
EL = Elementary School  
DO = District Office  
SS = Special School

**Region or HUB Codes:**  
UEN = Utah Education Network

**Libraries or Special Locations:**  
LIB = Public Library  
ATC = Advanced Technical Center  
ITS = Utah Stste Government  
SPC = Special Location

**\* Non Regional School Districts:**  
BOX = Box Elder School District  
CAC = Cache School District  
OGD = Ogden School District  
TOO = Tooele School District  
SLC = Salt Lake School District  
JOR = Jordan School District  
NEB = Nebo School District  
LOG = Logan School District  
WEB = Weber School District  
DAV = Davis School District  
MUR = Murray School District  
GRA = Granite School District  
PRO = Provo School District  
ALP = Alpine School District

**\* Central Utah Educational Services:**  
TIN = Tintic School District  
JUA = Juab School District  
NSP = North Sanpete School District  
SSP = South Sanpete School District  
SEV = Sevier School District  
PIU = Piute School District  
WAY = Wayne School District

**\* Northeast Utah Educational Services:**  
RIC = Rich School District  
MOR = Morgan School District  
NSU = North Summit School District  
SSU = South Summit School District  
PKG = Park City School District  
WAS = Wasatch School District  
DUC = Duchesne School District  
DAG = Daggett School District  
UIN = Uintah School District

**\* Southeast Educational Service Center:**  
CAR = Carbon School District  
EMR = Emery School District  
GRD = Grand School District  
SAJ = San Juan School District

**\* Southwest Educational Development Center:**  
MIL = Millard School District  
BEV = Beaver School District  
IRO = Iron County School District  
WST = Washington County School District  
GAR = Garfield School District  
KAN = Kane County School District

\* = Requires District/School Identifier

## Router and Switches

### Global Parameters

**IP classless** routing will be implemented. All IP devices on the network will be configured to support VLSM/CIDR. Use the following parameters:

```
ip classless
ip subnet-zero
```

Cisco **CEF** will be used on all devices that support its use. Use CEF distributed where supported. Use the following parameters:

```
ip cef
ip cef distributed
ip cef traffic-statistics
ip cef accounting non-recursive per-prefix prefix-length (Core and Hub devices)
```

The following UEN **DNS** servers will be configured on each router.

```
ip name-server 205.124.252.4
ip name-server 205.124.254.2
```

The following **system management** commands will be configured on all routers:

```
snmp-server community ***** ro 6 (see NOC for passwords)
snmp-server community ***** rw 6 (see NOC for passwords)
logging 205.124.252.25
logging trap warnings
access-list 6 permit 205.124.252.0 0.0.0.255
```

Optional parameters (IOS version 12.0 or greater – configure in this specific sequence to close a security loophole)

```
snmp-server community ILMI rw
no snmp-server community ILMI rw
snmp-server community ILMI ro 66
access-list 66 deny any log
```

```
logging 205.124.252.25
logging trap warnings (end sites)
logging trap information notifications (Core and Hub devices)
```

```
service timestamps log datetime
service timestamps debug datetime
```

```
ntp server
```

All IP devices with a single connection to UEN should have a **static default route** configured. On Cisco routers use the following statement:

*ip route 0.0.0.0 0.0.0.0 1.2.3.4* (where 1.2.3.4 is the address of the upstream single link)

Where the default network is selected via the “ip default-network” statement, that configuration should be removed.

### Access Lists

### Distribute Lists

### Interfaces

**Interface descriptions** will be applied to all active connections and will be configured as follows:

Format:

Destination Identifier\_Destination Site\_CID\_Type\_Comments

Where:

Destination identifier = 3 character position for identifier (see device naming standard)

Destination site = Freeform name with punctuation (used for reporting)

Circuit ID = Continuous number, capitalize letters

Circuit type = FR, P2P, DSL, AUSM, FRSM

Comments = Freeform (i.e., carrier name, microwave path, card #, line #, etc.)

Example:

description Jor\_Jordan HS\_64HCGL000123\_AUSM\_card 11 line 3

Note: Underscores are delimiters and must be present as a place holder to maintain field integrity for scripting purposes (i.e., Jor\_Jordan HS\_ \_AUSM\_card 11 line 3).

**Route caching** will be implemented on all interfaces that support it. Use the following parameters when supported:

*ip route-cache*

*ip route-cache flow*

*ip route-cache cef*

Bandwidth parameters will be applied as follows:

*bandwidth 1536* (Frame Relay T1 sub interfaces)

*bandwidth 1544* (Point-to-Point T1 circuits)

*bandwidth 3088* (IMA interfaces - 1544 x # of T1's)

### Routing Protocols

### Network Protocols

### Security Implementations

The following password parameters will be set on all devices:

Line vty 0 4 [password]

enable password [password]

enable secret [password for core and hub devices]

TACACS authentication will be utilized on all production routers. TACACS administration and authorization levels will be administered by the NOC security team.

## Port Configurations

## VTP Domains

## Trunk Protocols

## **Software**

### IOS versions

UEN has adopted the following procedures regarding the selection of IOS versions on production devices:

#### Software release selection criteria

- Any update classified as general release (Cisco “GD” or “LD”) unless otherwise approved by UEN Technical Management
- An update that supports standard hardware, a required feature or to fix a problem
- Next in line that replaces an End-Of-Life development fork
- Maintenance releases on current UEN-tested releases
- The IOS version has been tested in a lab environment or at an approved Pilot Site
- Passes CW2k upgrade analysis, Cisco SE review, and Cisco Bug Report review
- Exceptions to any of these restrictions require the approval of UEN Technical Management

#### Testing and Implementation

1. UEN will identify a representative sample of equipment (“pilot site”) within our network for testing a given IOS release. Ideally, there will be one device per typical hardware configuration on each platform. Pilot sites should be picked to minimize impact on a particular area of the network (i.e., not all within the same area) and should represent a variety of typical environments.
2. Pilot sites will have independently-routed console connectivity to the pilot devices (i.e., dial-in to console or to a terminal server), to make remote back-out possible. Where we don’t have console connectivity, updates require on-site personnel capable of backing out upgrades and the person must be on-site for at least one full business day after the upgrade to respond to problems. On-site personnel are not required to be from UEN
3. Pilot upgrades will be scheduled during non-critical hours, with advanced notification to affected customers and on-site personnel. This allows time to go on-site in case a remote upgrade fails.
4. After a pilot site has been operational and without problems for a minimum of four business days, the software is considered viable for that particular hardware configuration.

#### Post implementation procedures

1. Update the UEN approved IOS list for the particular hardware configuration. Complete all areas applicable to upgrade.
2. Send notification to appropriate mailing lists ([routers@uen.org](mailto:routers@uen.org), [techall@uen.org](mailto:techall@uen.org)).
3. The NOC is responsible for documenting, tracking and compliance of approved versions and will assist and support Field Operations to ensure required / recommended upgrades occur within a reasonable time frame.