

### Service Overview

#### Service Overview

A. AT&T VPN Service Options & Value Proposition:

- (a) AVPN is a single MPLS VPN service with multiple CPE management options: AVPN Transport (Customer manages premises CPE) AVPN Transport & Lite Managed Router AVPN Transport & Managed Router Support for hybrid networks (mix of managed and unmanaged options in a single contract)
- Enables customer to select management option they desire on a site-by-site basis
- Enables the customer to move up and down the management continuum as their requirements dictate

B. Bandwidth / Protocol Options:

IP Ports (PPP, MLPPP, FR Encap): up to 622M

- Fractional T1, only in case of E2A migration
- NxT1 (up to 8)
- Sub-rate T3, Full T3, sub-rate OC3 / STM12
- Ethernet (Shared and Dedicated): up to 1G

### Service Overview (cont)

#### C. Managed Router Options AT&T

owned, Third party supplier owned: if the pricing is ICB, follow the process in the Sales One International Countries job aid to get approval and router / router feature pricing, Customer "must" own -no longer available but may be ordered through custom to support Customers

D. Lite Managed Routers: For customers who do not need the full management option and are looking for a lower price point, Lite Managed Routers have 8 hours a day, 5 days a week, Next Business Day parts only support, where Managed Routers have 24 hours a day, 7 days a week, 4 hour onsite parts and AT&T tech support, Customer needs to have a person on site that can receipt replacement hardware and install same; which might include opening the router chassis and installing a replacement card or memory stick.

### Service Overview

### COS Package Profile - 4CoS

CoS Packages/Profiles (4CoS)

CoS Package	Classes Available	Profiles Number(s) Available	CoS Package	Classes Available	Profiles Number(s) Available
Multimedia High	CoS 1 CoS 2 CoS 3 CoS 4	101 through 124	Multimedia Standard	CoS 1 CoS 2 CoS 3 CoS 4	108 through 124
Critical Data	CoS 1 CoS 2 CoS 3 CoS 4	118 through 124	Business Data	CoS 1 CoS 2 CoS 3 CoS 4	122 through 124

Profile Number	Bandwidth Allocation (%)				Profile Number	Bandwidth Allocation (%)			
	CoS 1	CoS 2	CoS 3	CoS 4		CoS 1	CoS 2	CoS 3	CoS 4
101	80	0	0	100	113	20	80	0	10
102	80	80	10	10	114	20	40	80	10
103	80	80	30	10	115	10	80	10	10
104	80	40	30	30	116	10	60	30	10
105	80	80	10	10	117	10	40	30	30
106	60	80	30	20	118	0	100	0	0
107	60	40	30	30	119	0	80	10	10
108	50	0	0	100	120	0	60	30	10
109	40	80	10	10	121	0	40	30	30
110	40	80	30	10	122	0	0	100	0
111	40	40	30	30	123	0	0	90	10
112	20	80	10	10	124	0	0	50	50

Notes:

- Profile 125 = 100% CoS4, No CoS
- Profiles 118, 122 & 123 are single-CoS profiles. Traffic, including network management traffic, is queued on a first-in, first-out (FIFO) basis, and is not scheduled according to the CoS profile. (This is a Cisco implementation constraint.)

### CoS Packages/Profiles for AVPN :

Customer can also select 'Standard Data' – No CoS (no additional charge)

- Based on CoS package selected, Customer is entitled to select from various CoS profiles (or CoS bandwidth %'s)
- o Profiles available vary based on whether customer chooses 4CoS or 6CoS model
- 6CoS model provides for use of two additional data classes (CoS 2v and CoS5) and more granular bandwidth
- 6CoS Classes
- o CoS1: Designed for jitter- and latency-sensitive applications like voice and video.
- o CoS2v: designed to carry very high priority business applications (e.g., Citrix) or jitter-sensitive applications like video when CoS1 is already in use.
- o CoS2: Designed to carry high priority business applications (e.g., Sap, Oracle)
- o CoS3: Designed to carry medium priority business applications (e.g., http)

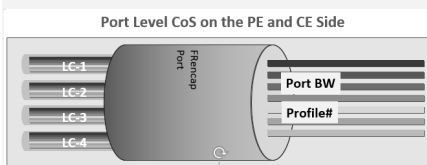
### CoS Packages/Profiles for AVPN : (cont)

- o CoS4: Designed to carry low priority business applications (e.g., email, ftp) and is used as the default setting if no CoS is chosen.
- o CoS5: Designed to carry low priority background business applications or it can be used as Scavenger (only competes with other classes for unused bandwidth)

Bandwidth is then allocated per logical channel based on CoS profile/bandwidth allocation selected

### CoS Packages/Profiles for AVPN :

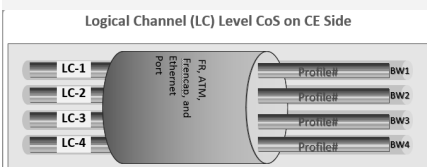
### Port Level CoS on the PE and CE side



- Port Level CoS used with FrenCap Ports with Unilink
  - o PPP and MLPPP cannot support multiple LCs (sub-interfaces)
- Single CoS Policy applied to the router's physical interface
- LCs are elastic/burstable
- o Fairness between LCs is a design point
  - o Sum of CoS1 across all LCs <= CoS1 on Port (LCs not enforced)
  - o Only one LC can carry CoS1 to avoid conflicts

### Port Level Cos on the PE and CE side

### Logical Level CoS – CE side



- Also called "Per VC CoS"
- Historically used by RPMs and CEs with FR, ATM, and IMA
- CoS Policy attached to a router's sub-interface
- Predefined LC Bandwidths (sum LCs < port)
- LCs are non-elastic/non-burstable to ensure fairness between LCs
- One CoS profile per LC (results in predetermined CoS bandwidths)

### Logical Level CoS – CE side



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### Resiliency Options:-

Single CE, Dual Access lines, Primary/Backup  
 Single CE Dual Access lines, Load Sharing  
 Dual CE, Dual Access, Primary/Backup  
 Dual CE, Dual Access, Load Sharing  
 Resiliency Options – ANIRA / AVTS Service Interworking (SIW)  
 Load sharing links must be same port type, speed, and CoS  
 Primary and backup links can be different port speed and CoS.  
 Backup PORT speed must be at least 50% of the PORT bandwidth of the primary link.

### Resiliency Options

### Diversity (POP and Switch):

(1) MPLS Port Switch Diversity Option (custom in MOW)  
 A. Ports are provisioned on diverse switches within the same POP  
 B. Customer defines diversity groups – places ports in those Groups.  
 C. AT&T ensures diversity.  
 (2) MPLS Port POP Diversity  
 A. Ports are provisioned on diverse switches/PE's in diverse POP's

### Diversity (POP and Switch): (cont)

B. Customer defines PoP  
 Diversity groups – places ports in those Groups. AT&T ensures diversity.  
 C. See FAQ on OIL for a complete description of Diversity:

### Diversity (POP and Switch):

### Unlink :

A. Unilink is supported on all FR IP ports T3 & above supported with FR encapsulation format only  
 B. Up to 12 Logical Channels for POS/FrEncap/ATM/Ethernet Ports  
 C. Note: In case of ASE Ethernet access with 1000BT (Electrical/Copper interface) only a MAX of 8 Logical channels are supported.  
 D. All routes terminate on single routing table in customer CE  
 E. VRF-Lite (aka MPLS in a box) support with Unilink is available

### Unlink :

### Multicast

Multicast Feature Support – Depends on Transport availability

### Multicast

### Routes Groups

Provides ability to share routing policies amongst a group of customer sites, e.g., selection of different internal Internet Gateway sites for specific subsets of remote sites.

### Routes Groups

### BFD

BFD sends small, periodic heartbeat messages used to detect forwarding issues between the AVPN service edge (PE) and the customer router across either an IP or Ethernet circuit. It allows for fast detection of a circuit problem, so that the traffic can be re-routed over a backup link quickly. BFD is supported on Ethernet and IP ports on IPv4

### BFD

### Service Interoperability (SIO) Options:

Provides site interoperability between PNT sites (managed and unmanaged) and AVPN sites (managed and unmanaged)

### Service Interoperability (SIO) Options:

### Other Supported Features:

a) MD5  
 b) BGP-R  
 c) LAN-BFD  
 d) Flat-Rate Billing and Usage Based Billing (UBB) options  
 e) Hub and Spoke  
 f) Cascaded Router Support  
 g) Routing Restriction

### Other Supported Features:

### Router packages are supported

Router Package Size and configurations depend on Access Type, Access Speed, Port Speed, Class of Service 1% (Real Time Traffic performance Need) and the physical interface type at the installation location. Use ASAP/ADOPT/ROME tool to select the correct router model for a given location. System Rules guide you and select the default router. You can go to the next higher available router, if needed.

- AVPN Equipment spreadsheet
- A. Very Basic
- B. Basic
- C. Small
- D. Medium
- E. Large
- F. XLarge
- G. Xlarge+
- H. XXL

### Router packages are supported



### AVPN Managed Out Of Band (OOB)

#### Connection Options:

- A. POTS (AT&T provides POTS modem & Customer provides POTS Line connection)
- B. WOOB (AT&T provides Wireless Modem & provides Wireless connection, Available in 55+ countries)

### AVPN Managed Out Of Band (OOB)

#### Connection Options:

#### RDS Validation:

- A) FMO RDS
- B) PMO RDS
- C) Order Types (AVPN , VVBE, VVB, PMAC)
- D) VPNs (PNT , EVPN , AVPN)
- E) Parameters to validate

#### RDS Validation:

#### RDS

<p>1. Does your data set have the following details:</p> <ul style="list-style-type: none"> <li>• Single PVC or more</li> <li>• Unlink</li> <li>• BGP routing or static</li> <li>• IPv4 only or dual stack</li> <li>• Simple 4G5 profiles or 6 cos</li> <li>• VPN name</li> <li>• Router package details</li> <li>• WOOB -Yes/No</li> <li>• Bearer (TDM/IP/Analog)</li> <li>• Handoff (Copper or Fiber)</li> </ul>	<p>2. Is the AVPN MPLS Port Type one of:</p> <ul style="list-style-type: none"> <li>• Ethernet</li> <li>• MPLP or E1/T1</li> </ul>	<p>3. Are any of the following features required:</p> <ul style="list-style-type: none"> <li>• Multicast</li> <li>• VPN name</li> <li>• RG, if any</li> <li>• BFD</li> <li>• Routing restriction</li> <li>• SNMP/Netflow</li> <li>• Port level cos</li> <li>• MDS</li> <li>• Diversity option</li> </ul>
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#### RDS

#### Tools Used

Follow the description of all the systems and tools required to an Engineer in order to perform LE activities.

- EFMS – workflow system with tasks & tracking order progress
- GIOM-For technical order entry into systems

#### Tools Used (cont)

- Pollers – jumpservers that allow access CE Router
- Action – operations tool to get all information about routers and customer
- IPSA and PAL – to configure QOS.( For QOS configuration design)
- Rapido – to create basic and enhanced configs + lan migration
- NC3 – a complete database of the site, inventory tool for validation and updating
- ICORE– backbone tools
- IGLOO – access and telco information for circuits
- GRDB – Global Resource Database (For verifying existing customer network)
- PCS Homer – Post Customer Signature (PCS) / Custom Contract Status Tool
- One-Off Lists – BET (EVPN/AVPN Availability Matrix)
- ETG- For equipment ordering & service/feature implementations

#### Tools Used

#### LE to PE notes:-

Customer: DSPA / ABC  
 Order: ISR20050739350  
 Site: Singapore, Singapore  
 Resiliency: No resiliency  
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 -----  
 Reassign 'Build CER Enhanced Config' task to LE?  
 NO  
 Traffic Classification:  
 DSPA\_TC702  
 BFD Required? NO  
 OOB Connection: POTS / ANALOG LINE  
 SAA Probe Required? YES  
 Responder Site ID:  
 EIDNASHVA  
 Responder Hostname/Loo-  
 pback: TBD 32.245.178.23  
 Probe Type: SAA\_1J\_2U-  
 \_2VJ\_3U\_4U\_5U  
 Responder Site ID:  
 EIDNASHVA  
 Responder Hostname/Loo-  
 pback: TBD 32.245.180.154  
 Probe Type: SAA\_1J\_2U-  
 \_2VJ\_3U\_4U\_5U  
 -----  
 -----  
 Additional instructions:  
 - Order features: Dual Stack IPv4/IPv6  
 Create technical notes :-  
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 -----  
 LE to PE notes:-

#### Technical Notes

1. First ask customer if you're migrating from existing service or if this is LAN activation for brand new site.
2. IP addresses and masks with customer. Compare LAN IPs, LAN helper IPs, standby IPs (will get to this later), DUPLEX/SPEED.
3. Routing protocol parameters (OSPF, EIGRP,BGP)
4. Monitoring protocols (SNMP, Netflow)
5. Standby protocol and standby parameters. check if you have correct standby protocol configured for your backup solution. You can have one of 3 types of standby protocols – depends on your backup solution.
6. VRRP – Virtual Router Redundancy Protocol – used when your backup solution is ANIRA (NETGATE).
7. HSRP – Hot Standby Router Protocol – used for any other backup solution – dual AVPN/EVPN routers, AVTS router as a backup, ANIRA (CISCO)
8. For HSRP you can check standby IP address, standby version, standby group and priorities.



### Technical Notes (cont)

9. If the Data and Voice Migration (BVoIP) need to migrate at the same time (single LAN Migration Window), then inform to OM to get BVOIP team engaged accordingly

### Technical Notes

### Handling Disco/Return IP address task:

Return IP address is before TTU and Disco IP address if after TTU so only Disco you need to create Adhoc task for IP provider and US ip Provider since lot of stuff to validate before we release the IP address.

### Handling Disco/Return IP address task:

### PAL TC: (Ip handling, BVOIP, MC, COS model)

1. TC is not in PAL database
2. TC mismatch in PAL for Address mode; Catch-all; Fragments; Service; GRUA; TC number; Domain/Region
3. TC mismatch in PAL for COS model (if COS4 or COS 6)
4. TC excludes Multicast
5. TC excludes BVOIP

### PAL TC: (Ip handling, BVOIP, MC, COS model)

### General Gaps:

1. TC's are faulty, missing, not complete (see more details above)
2. AVPN LM (E2A) the existing setup is not reviewed before the migration (EVPN, PNT or AVPN sites) = should not be reviewed prior to the TTU or during the RDS validation??,
  - i. Therefore, features are incorrect as: BGP AS, routing, IP addresses, COS profile, incorrect VPN is assigned etc.
  - ii. or we are missing components on the new installation due to this: an additional lan port, Voice card, NBFW, PNT SIO etc.
3. VPN Name , GRUA mismatch
4. IP addresses are assigned from an incorrect region.
5. SAA HUB and SPOKE are in a different VPN , reporting won't work.
6. MIAB config is missing before the TTU.
7. Often customer expects a DATA+VOICE migration, however only our DATA team is on the call

### General Gaps: (cont)

- i. If we migrate from an old/existing service where DATA+VOICE migration is needed in the same time how this is coordinated? Is LE responsible to provide info to MSIM about the solution?

### General Gaps:

### Best Practices: -

8. Ensure to Provide correct TC for the site in LE to PE notes.
9. Ensure to review the existing setup for Upgrade and Migrating sites (E2A or PNT to AVPN sites) for No. of LAN Ports used on old router and Services like BVOIP and NBFW.
10. Review the VPN Name, GRUA and notify the requester upfront where necessary to avoid correction MACD's.
11. Review that SAA HUB and SPOKE are in same VPN, to ensure reachability.
12. Ensure to add note to the PE for creating ad-hoc task for providing MIAB config before the TTU schedule and on receiving the task, upload VRF Lite configs ASAP.
13. Ensure to Review and provide note to OM/DTAC whether it is VOICE only or DATA+VOICE migration

### Best Practices: -

### Questions to ask yourself

- 1) Do I know why I am doing the work?
- 2) Have I identified and notified everybody (customers and internal groups Domestic and MOW) who will be directly involved or affected by this work?
- 3) Can I prevent or control service interruption?
- 4) When is the right time to do the work?
- 5) Am I trained and qualified to do this work?
- 6) Are the work request orders and supporting documentation current and error free?
- 7) Do I have an implementation plan? Have I walked through the procedure with the customer?
- 8) Do I have a test plan to verify my changes?
- 9) Do I have a back out plan? Do I have everything I need to quickly restore service if something goes wrong?

### Questions to ask yourself

