Fuentes de Tráfico

Natalia Clivio

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# Caracterización fuente de datos

Una vez, cargadas las trazas de cada suscriptor se calculan los parámetros de cada traza. Estos parámetros son: Capacidad del canal **C** que esta determinada por la velocidad contratada por el adonado, para este caso son 6 Mbps. \***Tamaño de buffer** B **Taza promedio de arribo Varianza de la taza de arribo parámetro Hurst** H **Parámetro temporal** t **Parámetro espacial** s\*\*

C<-6 #Capacidad del canal Mbps  
H<-0.8

Calculando la tasa promedio de arribo de cada traza:

for (i in 1:30) {  
 cat("u",i,"<-","mean(traza",i,"$Total.Incoming.bps/1000000, na.rm = TRUE)","\n",sep = "")  
}

## u1<-mean(traza1$Total.Incoming.bps/1000000, na.rm = TRUE)  
## u2<-mean(traza2$Total.Incoming.bps/1000000, na.rm = TRUE)  
## u3<-mean(traza3$Total.Incoming.bps/1000000, na.rm = TRUE)  
## u4<-mean(traza4$Total.Incoming.bps/1000000, na.rm = TRUE)  
## u5<-mean(traza5$Total.Incoming.bps/1000000, na.rm = TRUE)  
## u6<-mean(traza6$Total.Incoming.bps/1000000, na.rm = TRUE)  
## u7<-mean(traza7$Total.Incoming.bps/1000000, na.rm = TRUE)  
## u8<-mean(traza8$Total.Incoming.bps/1000000, na.rm = TRUE)  
## u9<-mean(traza9$Total.Incoming.bps/1000000, na.rm = TRUE)  
## u10<-mean(traza10$Total.Incoming.bps/1000000, na.rm = TRUE)  
## u11<-mean(traza11$Total.Incoming.bps/1000000, na.rm = TRUE)  
## u12<-mean(traza12$Total.Incoming.bps/1000000, na.rm = TRUE)  
## u13<-mean(traza13$Total.Incoming.bps/1000000, na.rm = TRUE)  
## u14<-mean(traza14$Total.Incoming.bps/1000000, na.rm = TRUE)  
## u15<-mean(traza15$Total.Incoming.bps/1000000, na.rm = TRUE)  
## u16<-mean(traza16$Total.Incoming.bps/1000000, na.rm = TRUE)  
## u17<-mean(traza17$Total.Incoming.bps/1000000, na.rm = TRUE)  
## u18<-mean(traza18$Total.Incoming.bps/1000000, na.rm = TRUE)  
## u19<-mean(traza19$Total.Incoming.bps/1000000, na.rm = TRUE)  
## u20<-mean(traza20$Total.Incoming.bps/1000000, na.rm = TRUE)  
## u21<-mean(traza21$Total.Incoming.bps/1000000, na.rm = TRUE)  
## u22<-mean(traza22$Total.Incoming.bps/1000000, na.rm = TRUE)  
## u23<-mean(traza23$Total.Incoming.bps/1000000, na.rm = TRUE)  
## u24<-mean(traza24$Total.Incoming.bps/1000000, na.rm = TRUE)  
## u25<-mean(traza25$Total.Incoming.bps/1000000, na.rm = TRUE)  
## u26<-mean(traza26$Total.Incoming.bps/1000000, na.rm = TRUE)  
## u27<-mean(traza27$Total.Incoming.bps/1000000, na.rm = TRUE)  
## u28<-mean(traza28$Total.Incoming.bps/1000000, na.rm = TRUE)  
## u29<-mean(traza29$Total.Incoming.bps/1000000, na.rm = TRUE)  
## u30<-mean(traza30$Total.Incoming.bps/1000000, na.rm = TRUE)

Calculando las varianzas de cada traza

for (i in 1:30) {  
 cat("V",i,"<-","var(traza",i,"$Total.Incoming.bps/1000000, na.rm = TRUE)","\n",sep = "")  
}

## V1<-var(traza1$Total.Incoming.bps/1000000, na.rm = TRUE)  
## V2<-var(traza2$Total.Incoming.bps/1000000, na.rm = TRUE)  
## V3<-var(traza3$Total.Incoming.bps/1000000, na.rm = TRUE)  
## V4<-var(traza4$Total.Incoming.bps/1000000, na.rm = TRUE)  
## V5<-var(traza5$Total.Incoming.bps/1000000, na.rm = TRUE)  
## V6<-var(traza6$Total.Incoming.bps/1000000, na.rm = TRUE)  
## V7<-var(traza7$Total.Incoming.bps/1000000, na.rm = TRUE)  
## V8<-var(traza8$Total.Incoming.bps/1000000, na.rm = TRUE)  
## V9<-var(traza9$Total.Incoming.bps/1000000, na.rm = TRUE)  
## V10<-var(traza10$Total.Incoming.bps/1000000, na.rm = TRUE)  
## V11<-var(traza11$Total.Incoming.bps/1000000, na.rm = TRUE)  
## V12<-var(traza12$Total.Incoming.bps/1000000, na.rm = TRUE)  
## V13<-var(traza13$Total.Incoming.bps/1000000, na.rm = TRUE)  
## V14<-var(traza14$Total.Incoming.bps/1000000, na.rm = TRUE)  
## V15<-var(traza15$Total.Incoming.bps/1000000, na.rm = TRUE)  
## V16<-var(traza16$Total.Incoming.bps/1000000, na.rm = TRUE)  
## V17<-var(traza17$Total.Incoming.bps/1000000, na.rm = TRUE)  
## V18<-var(traza18$Total.Incoming.bps/1000000, na.rm = TRUE)  
## V19<-var(traza19$Total.Incoming.bps/1000000, na.rm = TRUE)  
## V20<-var(traza20$Total.Incoming.bps/1000000, na.rm = TRUE)  
## V21<-var(traza21$Total.Incoming.bps/1000000, na.rm = TRUE)  
## V22<-var(traza22$Total.Incoming.bps/1000000, na.rm = TRUE)  
## V23<-var(traza23$Total.Incoming.bps/1000000, na.rm = TRUE)  
## V24<-var(traza24$Total.Incoming.bps/1000000, na.rm = TRUE)  
## V25<-var(traza25$Total.Incoming.bps/1000000, na.rm = TRUE)  
## V26<-var(traza26$Total.Incoming.bps/1000000, na.rm = TRUE)  
## V27<-var(traza27$Total.Incoming.bps/1000000, na.rm = TRUE)  
## V28<-var(traza28$Total.Incoming.bps/1000000, na.rm = TRUE)  
## V29<-var(traza29$Total.Incoming.bps/1000000, na.rm = TRUE)  
## V30<-var(traza30$Total.Incoming.bps/1000000, na.rm = TRUE)

Los datos de las trazas son:

for (i in 1:30) {  
 cat(i,"u",sep=",")  
 }

## 1,u2,u3,u4,u5,u6,u7,u8,u9,u10,u11,u12,u13,u14,u15,u16,u17,u18,u19,u20,u21,u22,u23,u24,u25,u26,u27,u28,u29,u30,u

for (i in 1:30) {  
 cat(i,"V",sep=",")  
 }

## 1,V2,V3,V4,V5,V6,V7,V8,V9,V10,V11,V12,V13,V14,V15,V16,V17,V18,V19,V20,V21,V22,V23,V24,V25,V26,V27,V28,V29,V30,V

u<-round(c(u1,u2,u3,u4,u5,u6,u7,u8,u9,u10,u11,u12,u13,u14,u15,u16,u17,u18,u19,u20,u21,u22,u23,u24,u25,u26,u27,u28,u29,u30),2)  
v<-round(c(V1,V2,V3,V4,V5,V6,V7,V8,V9,V10,V11,V12,V13,V14,V15,V16,V17,V18,V19,V20,V21,V22,V23,V24,V25,V26,V27,V28,V29,V30),2)  
   
tabla<-data.frame("Taza Arribo"=u,"Varianza Arribo"=v)  
tabla

## Taza.Arribo Varianza.Arribo  
## 1 1.17 0.53  
## 2 1.18 0.32  
## 3 1.20 0.56  
## 4 1.38 0.53  
## 5 1.21 0.36  
## 6 1.21 0.46  
## 7 1.47 1.66  
## 8 1.29 0.22  
## 9 1.27 2.27  
## 10 1.29 0.52  
## 11 1.31 0.47  
## 12 1.32 0.58  
## 13 1.32 0.71  
## 14 1.33 0.72  
## 15 1.53 3.04  
## 16 1.34 0.40  
## 17 1.36 0.77  
## 18 1.38 0.83  
## 19 1.40 0.69  
## 20 1.69 0.43  
## 21 1.63 0.57  
## 22 1.46 0.49  
## 23 1.48 0.44  
## 24 1.52 1.06  
## 25 1.59 1.38  
## 26 2.05 1.89  
## 27 1.90 0.53  
## 28 2.15 1.33  
## 29 2.19 4.58  
## 30 2.38 0.85

calculando los parámetros temporal y espacial de cada traza

B<-0.150   
  
t<-round((B/(C-u))\*(H/(1-H)),2) #time parameter (us)  
s<-round((B+(C+u)\*t)/(v\*t^(2\*H)),2) #space parameter (bitss^-1)  
  
#t<-log10(seq(length=100, from=1, to=200)) #time parameter (us)  
#s<-log10(seq(length=100, from=1, to=5)) #space parameter (bits^-1)

Por lo tanto el ancho de banda efectivo para cada traza es:

BWE<-round(u+(((s\*v)/2)\*(t^(2\*H-1))),2)  
BWE

## [1] 5.38 5.40 5.38 5.65 5.39 5.39 5.78 5.51 5.48 5.51 5.54 5.56 5.56 5.57  
## [15] 5.87 5.59 5.62 5.65 5.68 6.07 5.98 5.77 5.80 5.86 5.92 6.58 6.35 6.69  
## [29] 6.75 7.01

datos<-data.frame("Taza\_Arribo"=u,"Varianza\_Arribo"=v,"time"=t,"space"=s,BWE)  
datos

## Taza\_Arribo Varianza\_Arribo time space BWE  
## 1 1.17 0.53 0.12 56.69 5.38  
## 2 1.18 0.32 0.12 94.01 5.40  
## 3 1.20 0.56 0.13 50.74 5.38  
## 4 1.38 0.53 0.13 54.76 5.65  
## 5 1.21 0.36 0.13 79.02 5.39  
## 6 1.21 0.46 0.13 61.84 5.39  
## 7 1.47 1.66 0.13 17.67 5.78  
## 8 1.29 0.22 0.13 130.54 5.51  
## 9 1.27 2.27 0.13 12.62 5.48  
## 10 1.29 0.52 0.13 55.23 5.51  
## 11 1.31 0.47 0.13 61.25 5.54  
## 12 1.32 0.58 0.13 49.69 5.56  
## 13 1.32 0.71 0.13 40.59 5.56  
## 14 1.33 0.72 0.13 40.08 5.57  
## 15 1.53 3.04 0.13 9.72 5.87  
## 16 1.34 0.40 0.13 72.22 5.59  
## 17 1.36 0.77 0.13 37.61 5.62  
## 18 1.38 0.83 0.13 34.97 5.65  
## 19 1.40 0.69 0.13 42.16 5.68  
## 20 1.69 0.43 0.14 66.29 6.07  
## 21 1.63 0.57 0.14 49.66 5.98  
## 22 1.46 0.49 0.13 59.79 5.77  
## 23 1.48 0.44 0.13 66.74 5.80  
## 24 1.52 1.06 0.13 27.83 5.86  
## 25 1.59 1.38 0.14 20.42 5.92  
## 26 2.05 1.89 0.15 14.95 6.58  
## 27 1.90 0.53 0.15 52.42 6.35  
## 28 2.15 1.33 0.16 20.52 6.69  
## 29 2.19 4.58 0.16 5.98 6.75  
## 30 2.38 0.85 0.17 31.55 7.01

El ancho de banda efectivo promedio para la fuente de datos es:

BWEmean<-round(mean(BWE),2)  
BWEmean

## [1] 5.81

El intervalo de confianza, calculando el percentil 95 para el ancho de banda efectivo promedio para una fuente de datos es:

n<<-30  
sd<-sqrt((1/(n-1)\*(sum((BWE-BWEmean)^2))))  
  
normalci<-round(BWEmean+c(-1,1)\*qnorm(0.95)\*sd/sqrt(n),2)  
normalci

## [1] 5.68 5.94

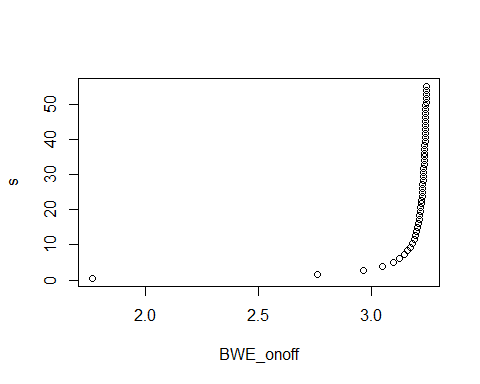
# Caracterización fuente de video

Preparando los datos

data\_VoD<-read.csv("C:/Users/NataliaA/Documents/Maestria/Tráfico L3/VoD/Subscribers\_detail.csv",  
 header=TRUE,sep=";",na.strings="NA",dec=",")

Aplicando modelo ON-OFF

Pon<-data\_VoD$Pon #Propabilidad de estado ON  
Poff<-data\_VoD$Poff #Propabilidad de estado OFF  
  
h<-7.5 #Mbps tasa pico  
  
Pon<-mean(Pon)  
Poff<-mean(Poff)  
  
space<-seq(length=50, from=0.5, to=55)  
s<-(space)  
BWE\_onoff<-(1/s)\*log10(Poff+(exp((h\*s))\*Pon))   
plot(BWE\_onoff,s)



De lo anterior se observa que s tiene un conportamiento asintótico, para lo cual considera un valor máximo de s antes de volverse indeterminado en 45

Pon<-data\_VoD$Pon #Propabilidad de estado ON  
Poff<-data\_VoD$Poff #Propabilidad de estado OFF  
  
s<-45  
BWE\_onoff<-round((1/s)\*log10(Poff+(exp((h\*s))\*Pon)),3)   
BWE\_onoff

## [1] 3.238 3.242 3.238 3.241 3.241 3.239 3.240 3.238 3.237 3.243 3.239  
## [12] 3.240 3.237 3.238 3.237 3.239 3.240 3.239 3.239 3.239 3.240 3.243  
## [23] 3.239 3.237 3.239 3.240 3.240 3.239 3.239 3.241

El ancho de banda efectivo promedio para la fuente de datos es:

BWEmean<-round(mean(BWE\_onoff),3)  
BWEmean

## [1] 3.239

El intervalo de confianza, calculando el percentil 95 para el ancho de banda efectivo promedio para una fuente de datos es:

n<<-30 #Cantidad de trazas muestreadas  
sd<-sqrt((1/(n-1)\*(sum((BWE\_onoff-BWEmean)^2))))  
  
normalci<-round(BWEmean+c(-1,1)\*qnorm(0.95)\*sd/sqrt(n),3)  
normalci

## [1] 3.239 3.239

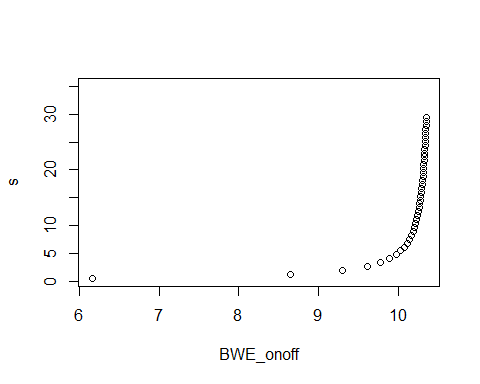
# Caracterización fuente de voz IP

Preparando los datos

data\_VoIP<-read.csv("C:/Users/NataliaA/Documents/Maestria/Tráfico L3/VoIP/Consumo\_Voip.csv",  
 header=TRUE,sep=";",na.strings="NA",dec=",")

Aplicando modelo ON-OFF

Pon<-data\_VoIP$Pon #Propabilidad de estado ON  
Poff<-data\_VoIP$Poff #Propabilidad de estado OFF  
  
h<-24 #Kbps tasa pico BW sobre IP con G729  
  
Pon<-mean(Pon)  
Poff<-mean(Poff)  
  
space<-seq(length=50, from=0.5, to=35)  
s<-(space)  
BWE\_onoff<-(1/s)\*log10(Poff+(exp((h\*s))\*Pon))   
plot(BWE\_onoff,s)



De lo anterior se observa que s tiene un conportamiento asintótico

Pon<-data\_VoIP$Pon #Propabilidad de estado ON  
Poff<-data\_VoIP$Poff #Propabilidad de estado OFF  
  
s<-29 #Antes de que el BWE se vuelva indeterminado  
BWE\_onoff<-round((1/s)\*log10(Poff+(exp((h\*s))\*Pon)),3)   
BWE\_onoff #[Kbps]

## [1] 10.316 10.342 10.358 10.348 10.320 10.340 10.360 10.343 10.346 10.362  
## [11] 10.349 10.344 10.306 10.331 10.374 10.340 10.358 10.302 10.337 10.336  
## [21] 10.330 10.337 10.356 10.322 10.339 10.354 10.332 10.318 10.340 10.373

El ancho de banda efectivo promedio para la fuente de datos es:

BWEmean<-round(mean(BWE\_onoff),3)  
BWEmean #[Kbps]

## [1] 10.34

El intervalo de confianza, calculando el percentil 95 para el ancho de banda efectivo promedio para una fuente de datos es:

n<<-30 #Cantidad de trazas muestreadas  
sd<-sqrt((1/(n-1)\*(sum((BWE\_onoff-BWEmean)^2))))  
  
normalci<-round(BWEmean+c(-1,1)\*qnorm(0.95)\*sd/sqrt(n),3)  
normalci #[Kbps]

## [1] 10.335 10.345