Android Checkpoints

Problem?

- A/B updates allow roll back of updates that fail to boot
  - Rolls back system, vendor partitions
- BUT if update modifies userdata before failing, cannot roll back modifications
- Android does not support updated userdata with old system/vendor

Solution 1

- If the file system supports snapshots, use them!
- We have added snapshot support to F2FS (v4.20)
    - Leverages the built in checkpointing of F2FS
    - Disable creating new checkpoints and in place data updates of existing data
        - Unmounting causes loss of data since last checkpoint
    - Limit garbage collection to new data
    - Requires a certain amount of garbage collection up front

Superblock		Checkpoint		Segment Information Table		Node Address Table		Segment Summary Area	Main Area
SB1	SB2	CP1	CP2	SIT1	SIT2	NAT1	NAT2		

Solution 2

- If no filesystem support, consider a block level solution
- dm-snap requires an extra block device for snapshot
  - Consider creating a file on userdata of appropriate size and using dm-linear to create a device from the underlying blocks?
  - Concerns that this only allows use of approximately half the free space without user mode resizing of said file
- Google has developed a driver, dm-bow, that stores rollback information in the free space on any file system
  - BOW == backup on write
  - Uses the trim bio commands to capture the free space from the filesystem
  - Efficiently uses all free space to store backups of all writes to allow rollback
  - Committing the changes is the simple path, and will be used 99% of the time

Discuss!